

Chapter 10 - Noise Barriers

NOISE BARRIERS (NB)

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SECTION 01

GROUND MOUNTED NOISE BARRIERS (NB-GM)

GENERAL NOTES – GROUND MOUNTED CONCRETE NOISE BARRIER

SPECIFICATIONS: MDOT SHA STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, DATED JULY 20XX.

DESIGN: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.

LOADING: THE DESIGN WIND LOAD FOR THIS GROUND MOUNTED NOISE BARRIER SYSTEM IS 48 PSF APPLIED PERPENDICULAR TO THE BARRIER IN EACH DIRECTION.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED TO RETAIN 2'-6" OF EARTH EMBANKMENT.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED FOR THE ADDITIONAL DEAD LOAD MOMENT CAUSED BY A TWO DEGREE (2°) ROTATION OF THE PANELS AND POSTS AT THE TOP OF DRILLED SHAFT.

CONCRETE: CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE:
 $f'c = 3000 \text{ psi}$ FOR ELEMENTS USING MIX NO. 3
 $f'c = 3000 \text{ psi}$ FOR ELEMENTS USING MIX NO. 4
 $f'c = 4000 \text{ psi}$ FOR ELEMENTS USING MIX NO. 6
 $f'c = 5000 \text{ psi}$ FOR PRECAST ELEMENTS USING MIX NO. 6

ALL CONCRETE FOR DRILLED SHAFTS SHALL BE MIX NO. 4 (3500 PSI).

ALL CONCRETE FOR GRADE BEAMS SHALL BE MIX NO. 3 (3500 PSI).

ALL CONCRETE FOR PRECAST CONCRETE ELEMENTS SHALL BE MIX NO. 6 (4500 PSI)

WHEN EXPOSED AGGREGATE IS SPECIFIED THE COARSE AGGREGATE SHALL BE AASHTO SIZE NO. 57 WASHED QUARTZ GRAVEL.

PRESTRESSED CONCRETE: CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE $f'c = 5000 \text{ psi}$, WHILE THE MINIMUM COMPRESSIVE STRENGTH AT TRANSFER SHALL BE $f'ci = 3500 \text{ psi}$.

ALL PRESTRESSED CONCRETE SHALL BE SELF-CONSOLIDATING WITH A 28 DAY COMPRESSIVE STRENGTH OF $f'c = 5000 \text{ psi}$.

IF GRADE BEAMS OR OFFSET BRACKETS ARE SPECIFIED IN THE PLANS, STEEL POSTS SHALL BE USED IN LIEU OF CONCRETE AT THESE LOCATIONS.

REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A 615 GRADE 60, WITH A YIELD STRENGTH FOR DESIGN OF $f_y = 60,000 \text{ psi}$.

WELDED WIRE REINFORCEMENT (WWR) SHALL CONFORM TO ASTM A 497 WITH A YIELD STRENGTH FOR DESIGN OF $f_y = 70,000 \text{ psi}$.

ALL SPLICES, NOT SHOWN, SHALL BE LAPPED AS PER BAR LAP CHARTS.

REINFORCING STEEL AND WELDED WIRE REINFORCEMENT THAT ARE WITHIN 10 FT OF THE OUTSIDE EDGE OF PAVED SHOULDER, MEASURED ALONG ANY TRAJECTORY SHALL BE EPOXY COATED.

ADDITIONAL REINFORCING WHICH MAY BE REQUIRED FOR HANDLING IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBMITTED FOR APPROVAL WITH THE WORKING DRAWINGS.

PRETENSIONING STEEL: PRETENSIONING STEEL SHALL CONSIST OF 1/2" DIAMETER 7-WIRE BRIGHT LOW RELAXATION STRANDS CONFORMING TO THE REQUIREMENTS OF M 203 GRADE 270. EACH STRAND SHALL BE PRETENSIONED TO 31,000 lb (0.75 fpu). HAVE AN ULTIMATE YIELD STRENGTH OF 41,300 lb (fpu) AND A YIELD STRENGTH OF 37,200 lb (0.90 fpu).

STRUCTURAL STEEL: STRUCTURAL STEEL FOR SHAPES, POSTS, AND BASE PLATES SHALL CONFORM TO ASTM A 709 GRADE 50W.

STRUCTURAL STEEL FOR ANCHOR PLATES SHALL CONFORM TO ASTM A 36. ANCHOR RODS SHALL BE ASTM F 1554 GRADE 55 S-1, NUTS SHALL BE CARBON AND ALLOY STEEL ASTM A 563, WASHERS FOR THE TOP OF THE BASE PLATE SHALL BE HARDENED CLIPPED STEEL WASHERS ASTM F 436. ALL OTHER WASHERS SHALL BE HARDENED STEEL WASHERS ASTM F 436. ANCHOR PLATES, ANCHOR RODS, NUTS, AND WASHERS SHALL BE HOT DIPPED GALVANIZED IN CONFORMANCE WITH ASTM A 153.

ALL WELDS SHALL CONFORM TO ANSI/AWS D1.1.

PRECAST CONCRETE POSTS AND PANELS: FOR PANEL AND POST SURFACE TEXTURE, COLOR TREATMENT, ANTI-GRAFFITI COATING, OR NEED FOR EPOXY COATING, SEE THE SPECIAL PROVISIONS.

FALSE JOINTS SHALL BE PROVIDED FOR CONFORMITY IN THE HORIZONTAL ALIGNMENT OF PANEL JOINTS. THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS DETAILING THE PROPOSED FALSE JOINT AND OBTAIN WRITTEN APPROVAL PRIOR TO PRODUCTION OF A SAMPLE PANEL. THE CONTRACTOR SHALL PRODUCE A 4' X 4' SAMPLE PANEL WITH THE APPROVED FALSE JOINT AND APPROPRIATE ARCHITECTURAL FINISH FOR APPROVAL PRIOR TO USE.

EXISTING STRUCTURES: ALL DIMENSIONS AFFECTED BY THE GEOMETRICS, AND/OR LOCATION OF THE EXISTING STRUCTURE SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR, BEFORE ANY CONSTRUCTION IS DONE, AND BEFORE ANY REINFORCING STEEL, ETC., IS ORDERED OR FABRICATED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUPPLY THE ENGINEER WITH ALL FIELD DIMENSIONS REQUIRED TO CHECK DETAIL DRAWINGS. THE () MARKS INDICATE EXISTING DIMENSIONS AND STATIONS THAT MAY VARY AND DO REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.

CONTRACT APPROVED OPTIONS: THE OPTIONS INDICATED BELOW WITH AN "X" ARE PERMITTED IN THIS CONTRACT.

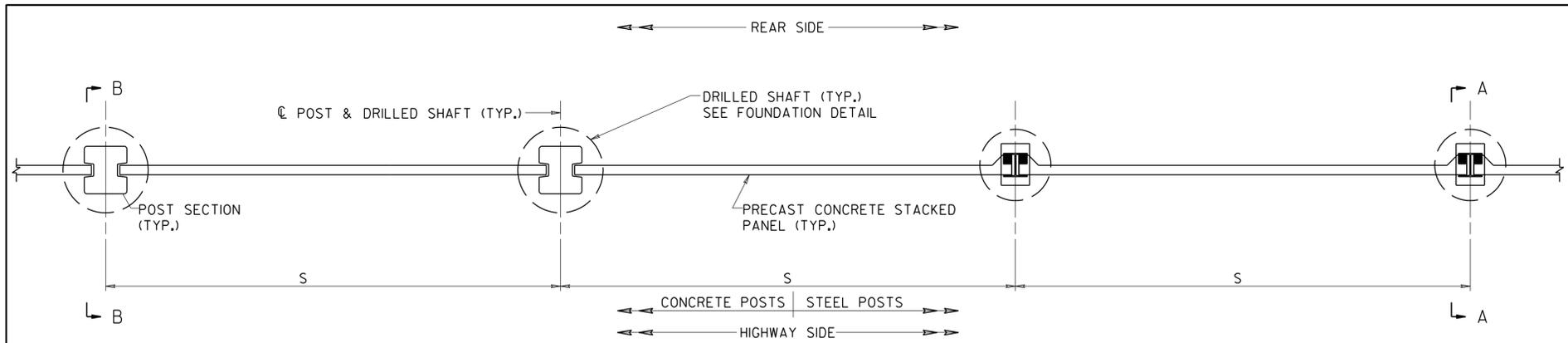
POST SPACING:

- 12'
 16'
 20'

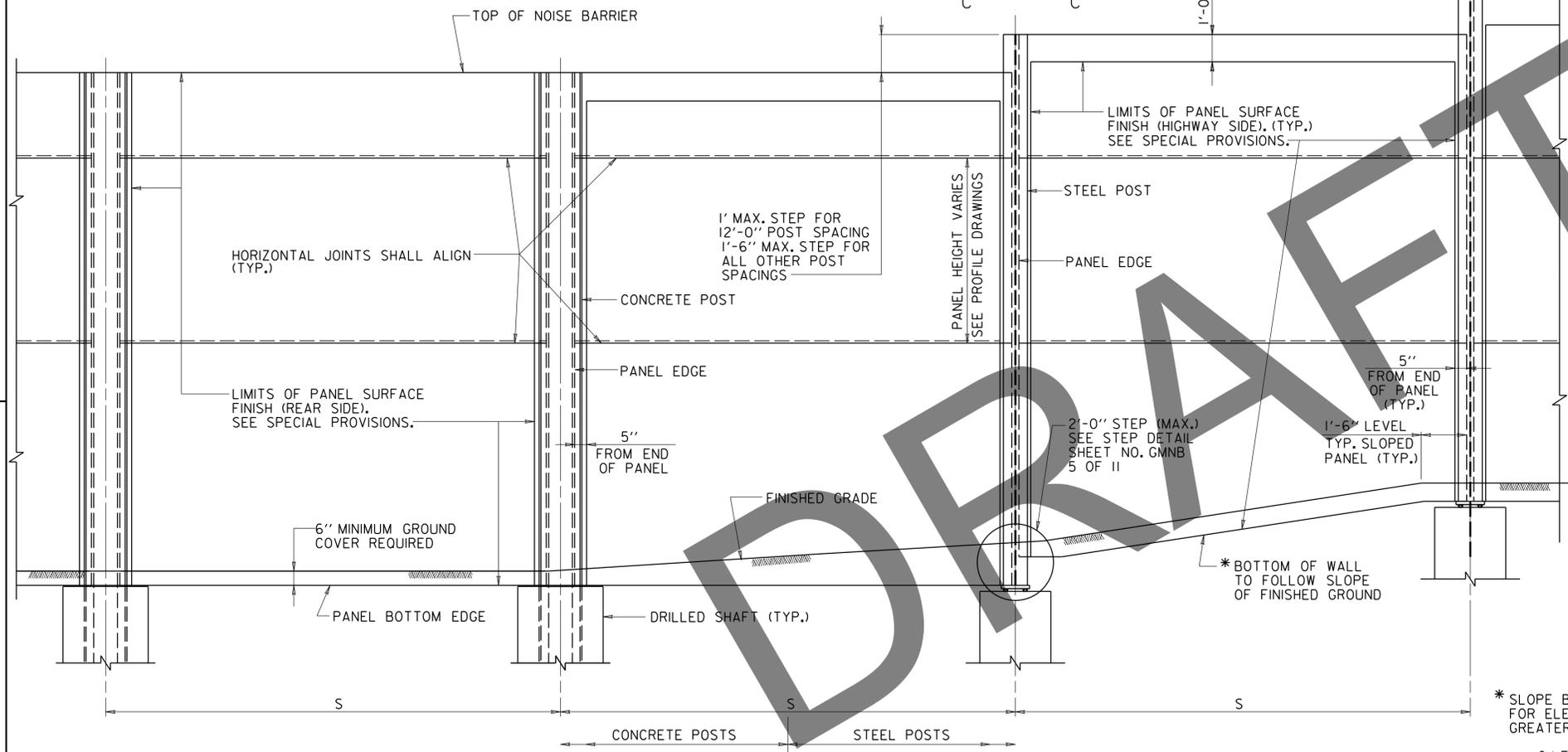
POST TYPE:

- STEEL
 CONCRETE

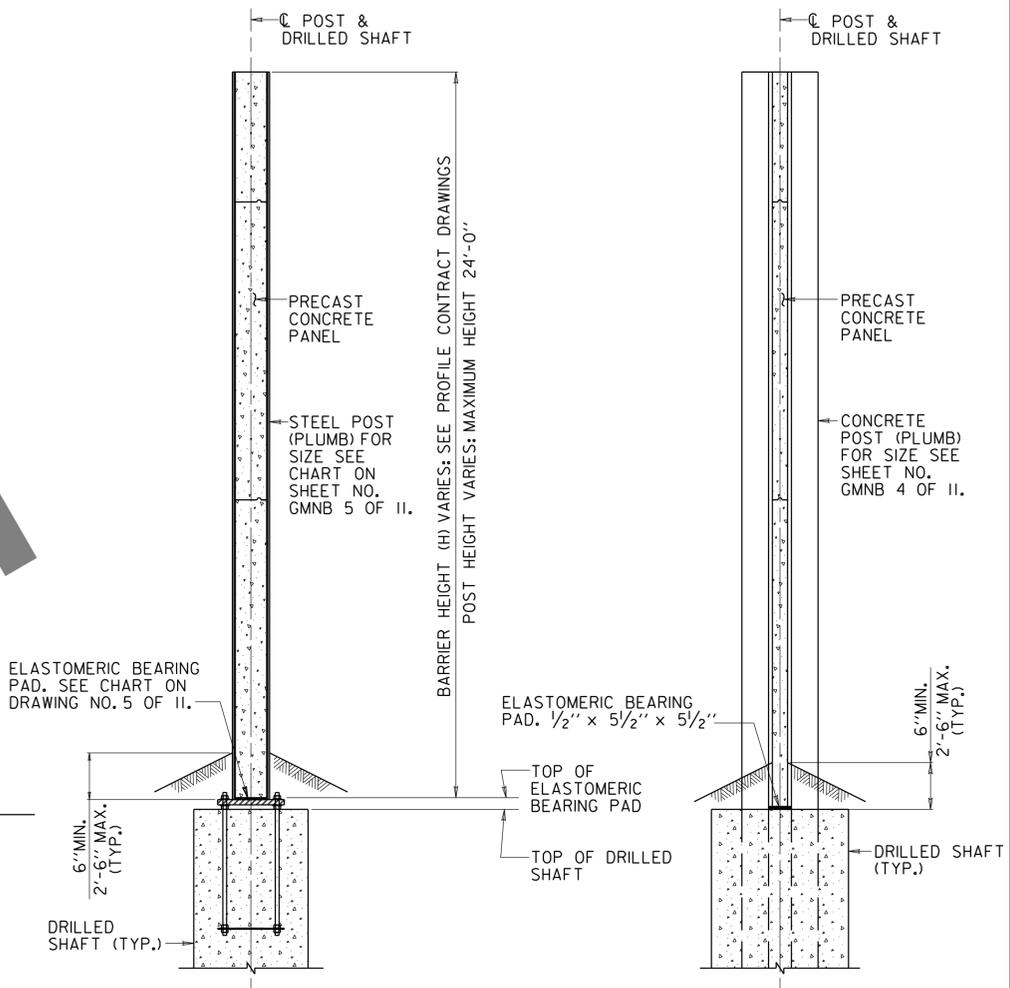
DETAIL NO.		OFFICE OF STRUCTURES
NB-GM-101		GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT
APPROVAL	GENERAL NOTES	
_____ DIRECTOR OFFICE OF STRUCTURES		
DATE:	SCALE: <u>VARIES</u> DATE: <u><MONTH, YEAR></u> CONTRACT NO. <u><CONTRACT NO.></u>	
VERSION	DESIGNED BY <u>SHA</u> DRAWN BY <u>SHA</u> CHECKED BY <u>SHA</u>	
1.0	DRAWING NO. NB-GM-1 OF 11	SHEET NO. X OF X



PLAN
SCALE : 3/8" = 1'-0"



ELEVATION
SCALE : 3/8" = 1'-0"



SECTION A-A
SCALE : 3/4" = 1'-0"

SECTION B-B
SCALE : 3/4" = 1'-0"

* SLOPE BOTTOM OF PANEL FOR ELEVATION CHANGES GREATER THAN:
6:1 FOR 12' PANELS
8:1 FOR 16' PANELS
10:1 FOR 20' PANELS

NOTES:

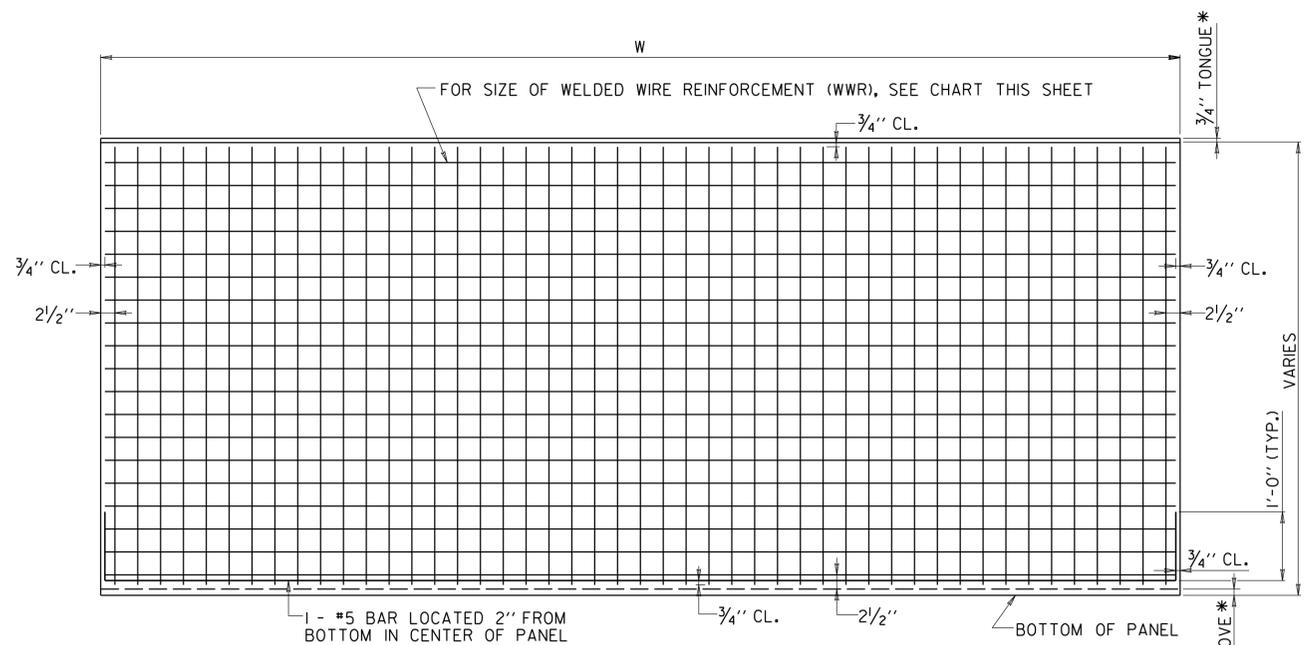
1. FOR GENERAL NOTES, SEE SHEET NO. GMNB 1 OF 11.
2. POST SHALL EXTEND TO TOP OF PANELS, IF TOP OF ADJACENT PANELS ARE AT DIFFERENT ELEVATIONS. THE POST SHALL EXTEND TO THE TOP OF THE HIGHER PANEL.
3. MAXIMUM POST HEIGHT IS 24'-0" MEASURED FROM TOP OF BASE PLATE (STEEL POSTS) OR TOP OF DRILLED SHAFT (CONCRETE POSTS) TO TOP OF POST.
4. FOR VIEW C-C, SEE SHEET NO. GMNB 5 OF 11.

DETAIL NO.	NB-GM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT
DATE:	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA	
VERSION	1.0	
DRAWING NO. GMNB-2 OF 11		SHEET NO. X OF X

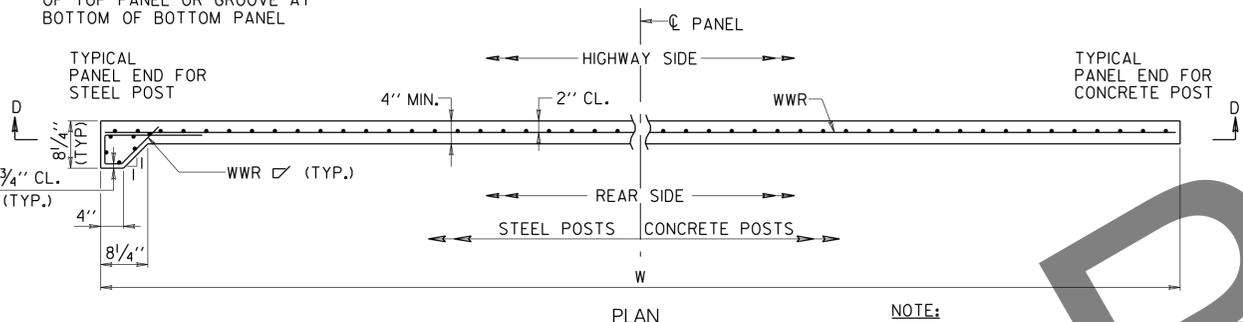
STRUCTURE INVENTORY NO. X

SURVEY BOOK NO. X

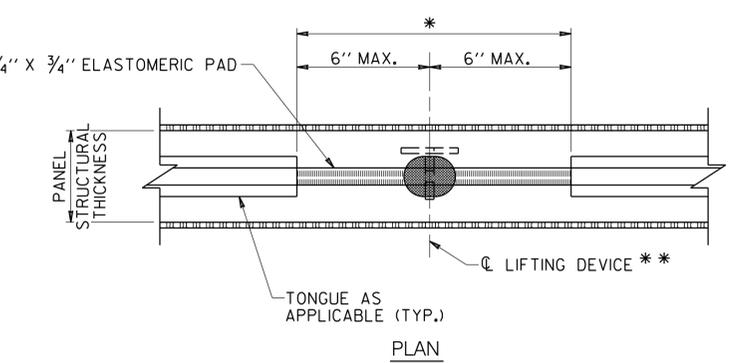
FILE: NB-GM-101_02.dgn
PLOTFILE: Thursday, November 14, 2019 AT 03:28 PM
BY: KJash



* DO NOT PROVIDE TONGUE AT TOP OF TOP PANEL OR GROOVE AT BOTTOM OF BOTTOM PANEL



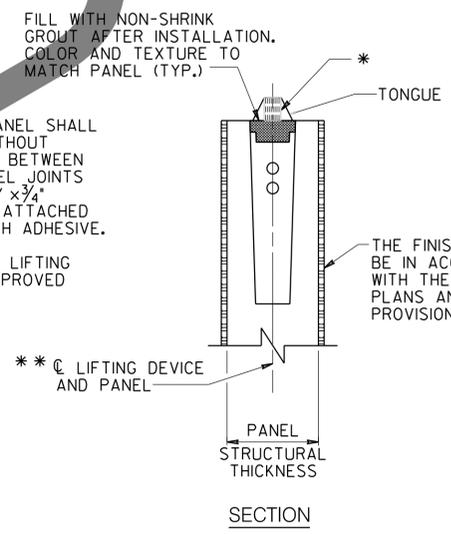
STANDARD PANEL DETAILS
SCALE : 3/4" = 1'-0"



NOTE: USE THIS DETAIL FOR SEALING LIFTING DEVICES IN THE TOP OF THE TOP PANEL, NO ELASTOMERIC PAD REQUIRED.

LIFTING DEVICE SEAL DETAILS
SCALE: 3" = 1'-0"

NOTE: PANELS FOR STEEL AND CONCRETE POSTS SYMMETRICAL ABOUT CL RESPECTIVELY.



* THIS REGION OF PANEL SHALL BE FABRICATED WITHOUT TONGUE. THE AREA BETWEEN THE STACKED PANEL JOINTS SHALL HAVE A 3/4" x 3/4" ELASTOMERIC PAD ATTACHED TO THE PANEL WITH ADHESIVE.

* TYPE AND SIZE OF LIFTING DEVICES TO BE APPROVED BY THE ENGINEER.

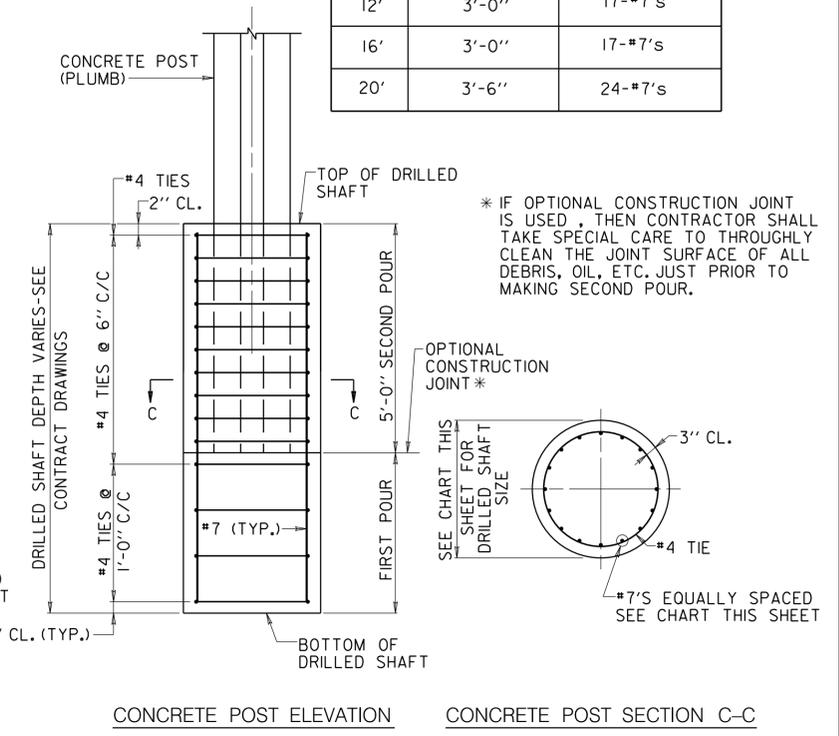
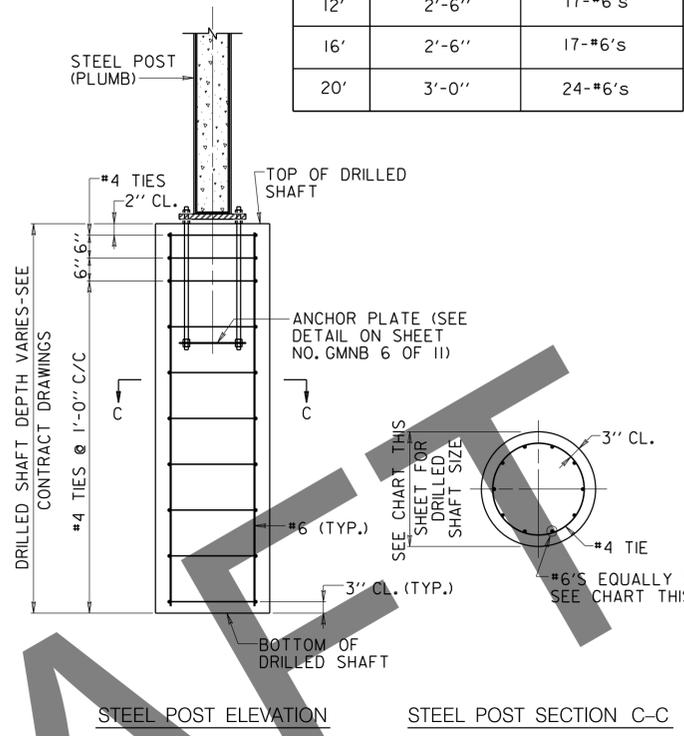
THE FINISH SHALL BE IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIAL PROVISIONS (TYP.)

STACKED PANEL TONGUE AND GROOVE DETAILS
SCALE : 3" = 1'-0"

- NOTES:
1. THE MINIMUM PANEL THICKNESS IS 4". ANY PANEL SURFACE TREATMENT SHALL BE AN ADD-ON TO THE MINIMUM PANEL THICKNESS.
 2. MINIMUM COVER FOR REINFORCING IN PRECAST PANEL SHALL BE 3/4" EXCEPT AS NOTED.
 3. WELDED WIRE REINFORCEMENT (WWR) IN PANEL END FOR STEEL POSTS SHALL BE PLACED AS SHOWN.
 4. STACKED PANELS ARE OPTIONAL FOR 12'-0" POST SPACINGS.
 5. THE MINIMUM HEIGHT OF ANY STACKED PANEL IS 4'-0". THE MAXIMUM HEIGHT OF A STACKED PANEL IS 12'-0".
 6. THE MAXIMUM ANGLE THAT A PANEL CAN BE PLACED WITHIN A STEEL POST IS 3°-00'-00".

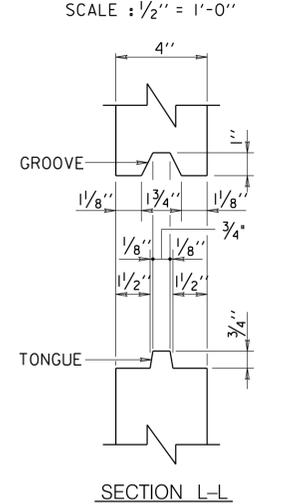
STEEL POST FOUNDATION		
POST SPACING	DRILLED SHAFT DIAMETER	REINFORCEMENT
12'	2'-6"	17-#6's
16'	2'-6"	17-#6's
20'	3'-0"	24-#6's

CONCRETE POST FOUNDATION		
POST SPACING	DRILLED SHAFT DIAMETER	REINFORCEMENT
12'	3'-0"	17-#7's
16'	3'-0"	17-#7's
20'	3'-6"	24-#7's



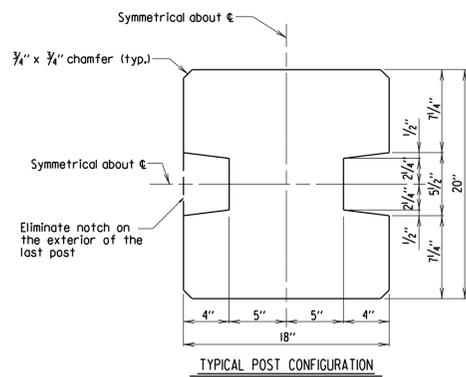
* IF OPTIONAL CONSTRUCTION JOINT IS USED, THEN CONTRACTOR SHALL TAKE SPECIAL CARE TO THOROUGHLY CLEAN THE JOINT SURFACE OF ALL DEBRIS, OIL, ETC. JUST PRIOR TO MAKING SECOND POUR.

FOUNDATION DETAIL
SCALE : 1/2" = 1'-0"

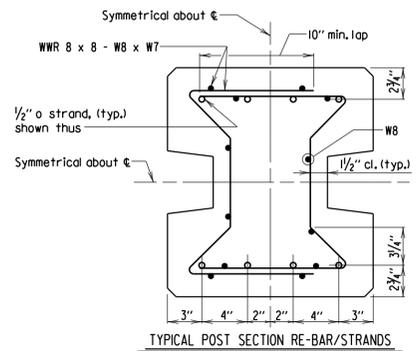


PANEL REINFORCING			
POST SPACING	W FOR STEEL POSTS	W FOR CONCRETE POSTS	WWR
12'	11'-9"	11'-0"	WWR 4 x 4- W5 x W5
16'	15'-9"	15'-0"	WWR 4 x 4- W7 x W7
20'	19'-9"	19'-0"	WWR 4 x 4- W10 x W10

DETAIL NO.	OFFICE OF STRUCTURES	
NB-GM-101	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT	
APPROVAL		
DIRECTOR OFFICE OF STRUCTURES	PANEL AND FOUNDATION DETAILS	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
1.0	DRAWN BY SHA	
	CHECKED BY SHA	
	DRAWING NO. GMMB-3 OF 11	SHEET NO. X OF X



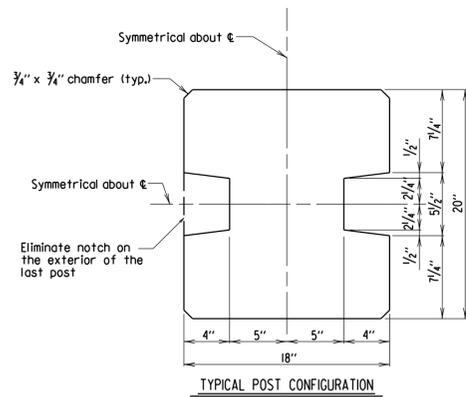
TYPICAL POST CONFIGURATION



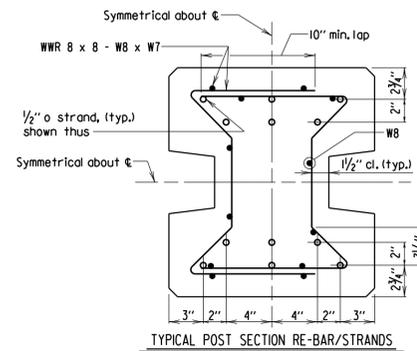
TYPICAL POST SECTION RE-BAR/STRANDS

**PRECAST PRESTRESSED CONCRETE POST
20" x 18" WITH 8 STRANDS**

SCALE : 1 1/2" = 1'-0"



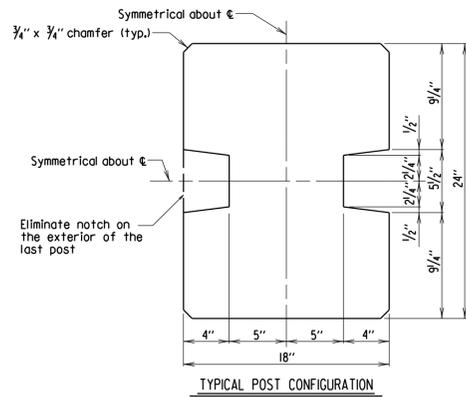
TYPICAL POST CONFIGURATION



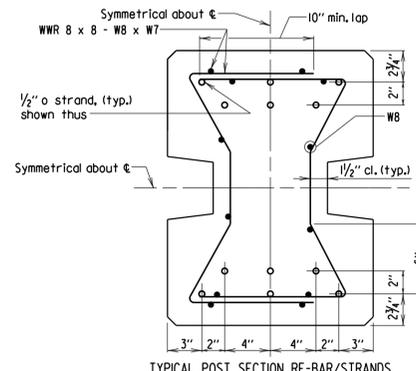
TYPICAL POST SECTION RE-BAR/STRANDS

**PRECAST PRESTRESSED CONCRETE POST
20" x 18" WITH 12 STRANDS**

SCALE : 1 1/2" = 1'-0"



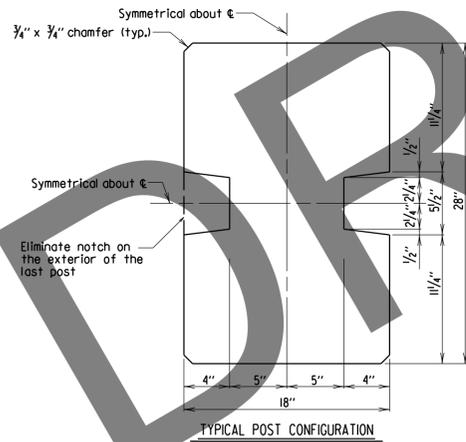
TYPICAL POST CONFIGURATION



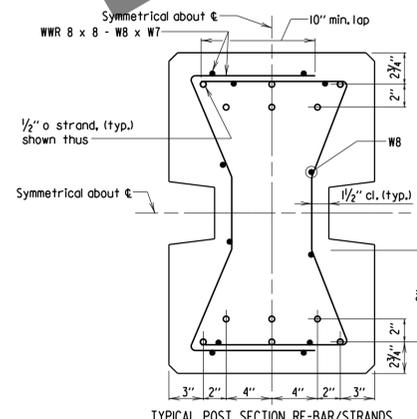
TYPICAL POST SECTION RE-BAR/STRANDS

**PRECAST PRESTRESSED CONCRETE POST
24" x 18" WITH 12 STRANDS**

SCALE : 1 1/2" = 1'-0"



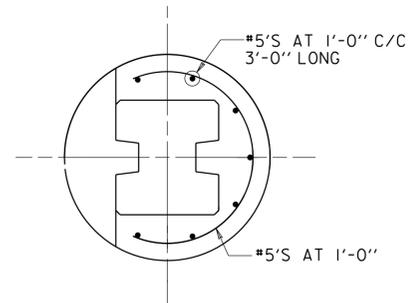
TYPICAL POST CONFIGURATION



TYPICAL POST SECTION RE-BAR/STRANDS

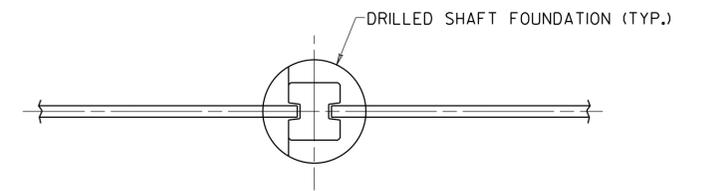
**PRECAST PRESTRESSED CONCRETE POST
28" x 18" WITH 12 STRANDS**

SCALE : 1 1/2" = 1'-0"



ADDITIONAL REBAR FOR DRILLED SHAFT STEP

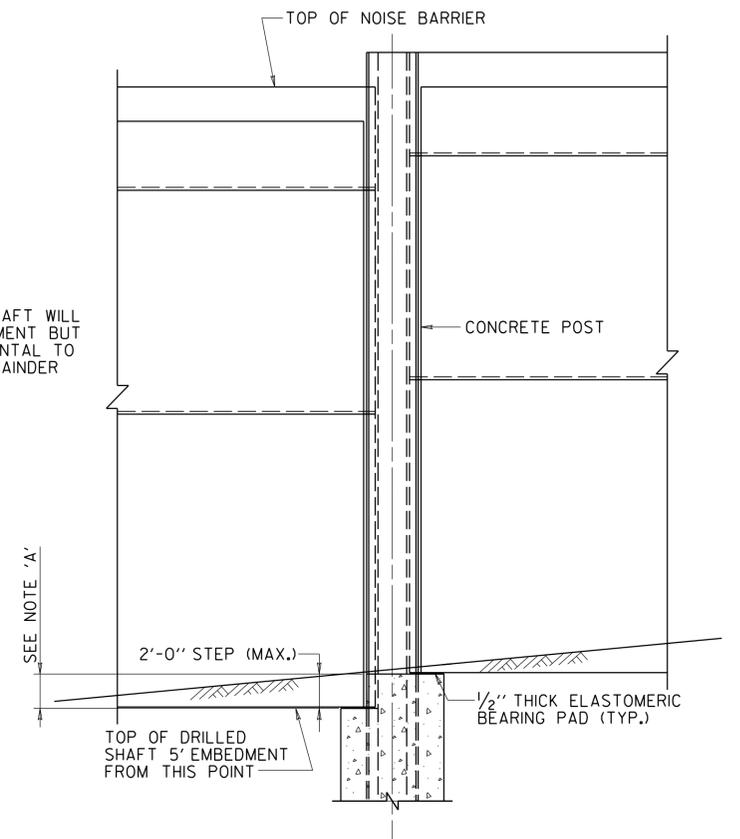
SCALE : 3/8" = 1'-0"



PLAN
SCALE : 3/16" = 1'-0"

NOTE 'A':

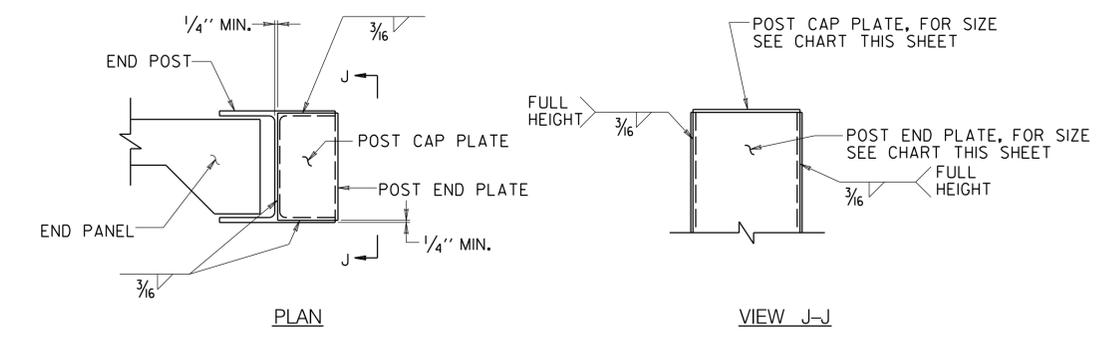
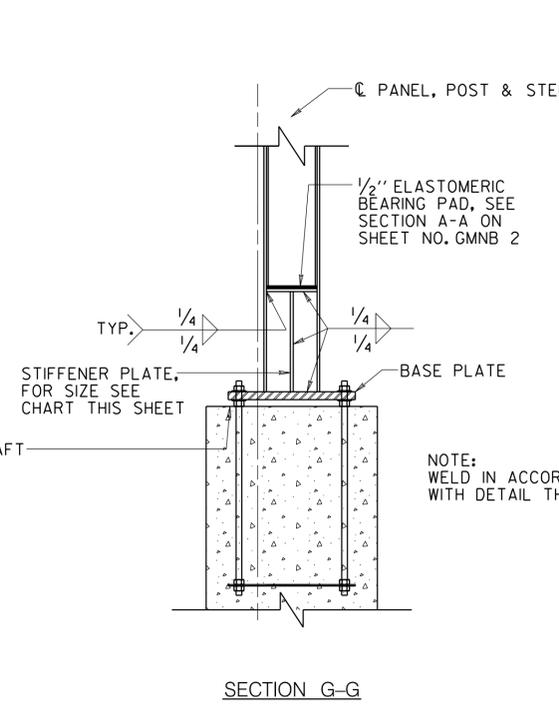
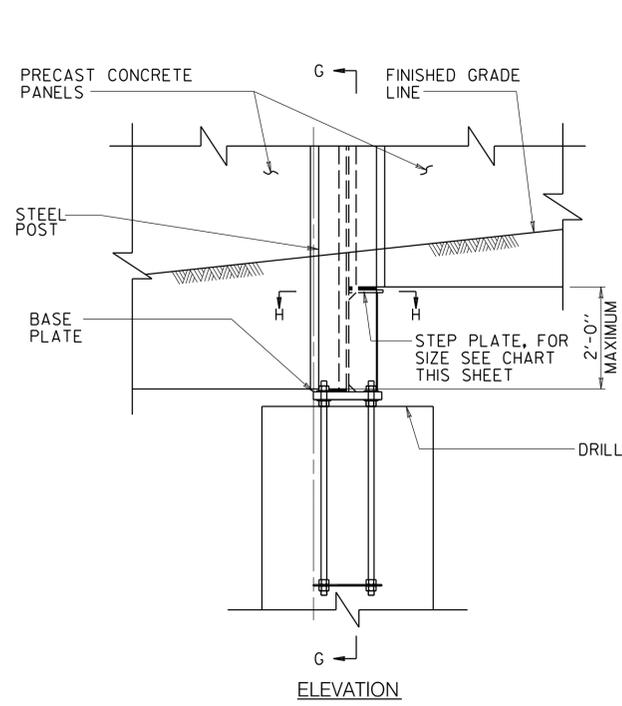
THIS PORTION OF DRILLED SHAFT WILL NOT BE MEASURED FOR PAYMENT BUT SHALL BE CONSIDERED INCIDENTAL TO THE PLACEMENT OF THE REMAINDER OF THE DRILLED SHAFT.



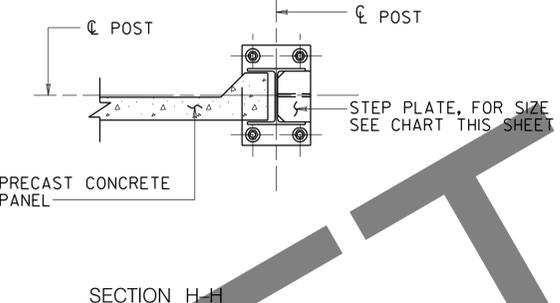
ELEVATION
SCALE : 3/16" = 1'-0"

POST SIZES AND PRESTRESSING REQUIREMENTS				
Post Spacing (ft.)		12	16	20
BARRIER HEIGHT	0' < H ≤ 20'	20" x 18" with 8 strands	20" x 18" with 12 strands	24" x 18" with 12 strands
	20' < H ≤ 22'	20" x 18" with 8 strands	20" x 18" with 12 strands	24" x 18" with 12 strands
	22' < H ≤ 24'	20" x 18" with 12 strands	24" x 18" with 12 strands	28" x 18" with 12 strands

DETAIL NO.	OFFICE OF STRUCTURES	
NB-GM-101	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT	
APPROVAL	MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION	
DIRECTOR OFFICE OF STRUCTURES	CONCRETE POST DETAILS	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA	
1.0	DRAWING NO. GMNB-4 OF 11	SHEET NO. X OF X



END OF WALL - STEEL POST - DETAIL
SCALE : 1/2" = 1'-0"

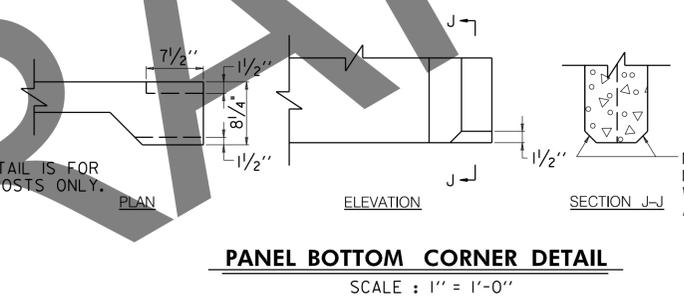


SECTION H-H

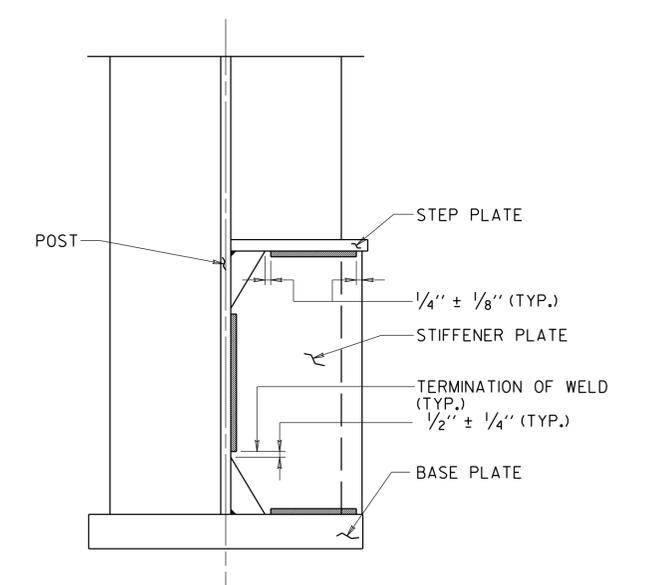
STEP DETAIL
SCALE : 3/4" = 1'-0"

STEEL POST DETAILS							
S	BARRIER HEIGHT (H)	POST	STEP PLATE	STIFFENER PLATE	POST CAP PLATE	POST END PLATE	ELASTOMERIC BEARING PAD
12'	H ≤ 20'	HP 10x42	1/2" x 6"	1/2" x 5 3/4"	1/4" x 5 1/4" x 9"	1/4" x 9" x H	1/2" x 5 1/2" x 8"
	20' < H ≤ 22'	HP 10x57	1/2" x 6"	1/2" x 5 3/4"	1/4" x 5 3/8" x 9 1/2"	1/4" x 9 1/2" x H	1/2" x 5 1/2" x 8"
	22' < H ≤ 24'	HP 10x57	1/2" x 6"	1/2" x 5 3/4"	1/4" x 5 3/8" x 9 1/2"	1/4" x 9 1/2" x H	1/2" x 5 1/2" x 8"
16'	H ≤ 20'	HP 10x57	1/2" x 6"	1/2" x 5 3/4"	1/4" x 5 3/8" x 9 1/2"	1/4" x 9 1/2" x H	1/2" x 5 1/2" x 8"
	20' < H ≤ 22'	W 10x60	1/2" x 8"	1/2" x 7 3/4"	1/4" x 5 1/4" x 9 1/2"	1/4" x 9 1/2" x H	1/2" x 7 1/2" x 8"
	22' < H ≤ 24'	W 10x77	1/2" x 8"	1/2" x 7 3/4"	1/4" x 5 1/4" x 9 3/4"	1/4" x 9 3/4" x H	1/2" x 7 1/2" x 8"
20'	H ≤ 20'	W 10x68	1/2" x 8"	1/2" x 7 3/4"	1/4" x 5 1/4" x 9 3/4"	1/4" x 9 3/4" x H	1/2" x 7 1/2" x 8"
	20' < H ≤ 22'	W 10x77	1/2" x 8"	1/2" x 7 3/4"	1/4" x 5 1/4" x 10"	1/4" x 10" x H	1/2" x 7 1/2" x 8"
	22' < H ≤ 24'	W 10x88	1/2" x 8"	1/2" x 7 3/4"	1/4" x 5 1/4" x 10"	1/4" x 10" x H	1/2" x 7 1/2" x 8"

NOTE:
THIS DETAIL IS FOR STEEL POSTS ONLY.

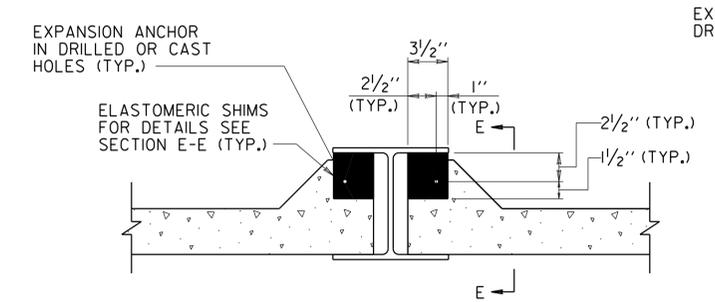


PANEL BOTTOM CORNER DETAIL
SCALE : 1" = 1'-0"

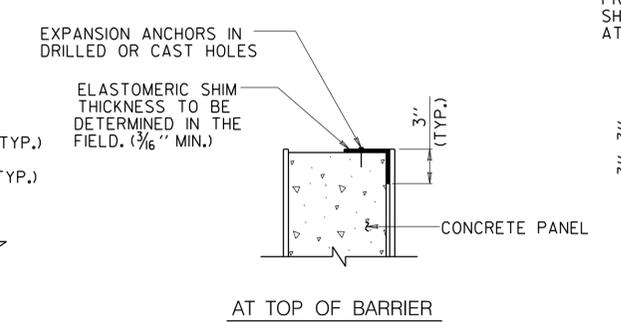


STIFFENER PLATE WELD TERMINATION DETAIL
SCALE : 3" = 1'-0"

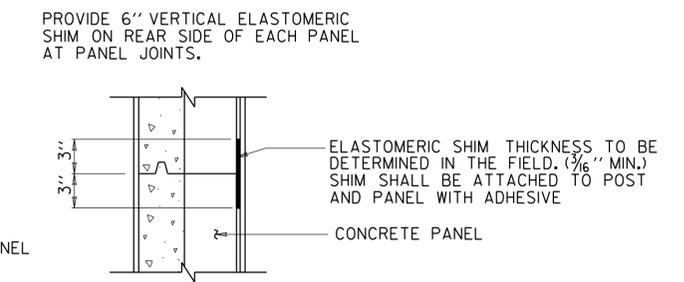
NOTES:
THE HEIGHTS OF THE POSTS SHALL VARY AS SHOWN ON THE PLANS. SPACING OF THE POSTS SHALL BE 12'-0", 16'-0", OR 20'-0" CENTER LINE TO CENTER LINE OR AS NOTED ON THE PLANS.



VIEW C-C



AT TOP OF BARRIER

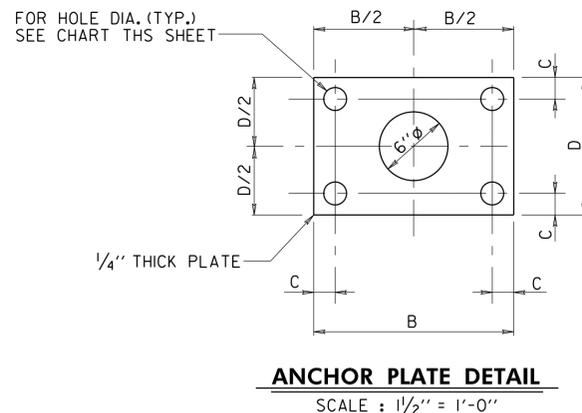
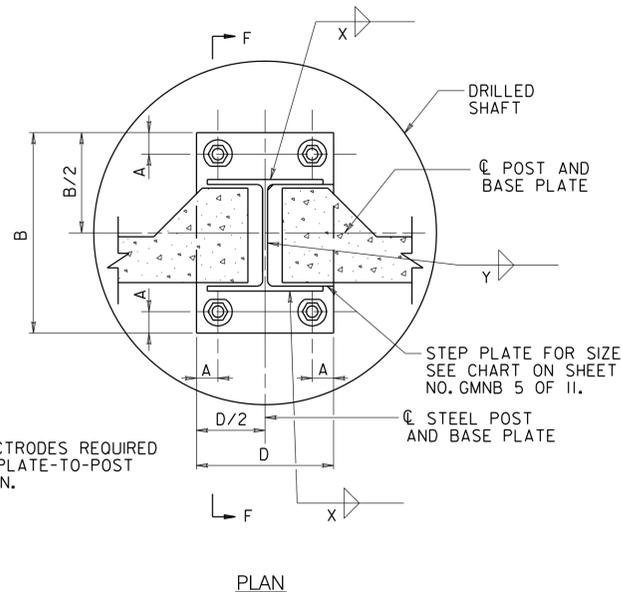


AT PANEL JOINT

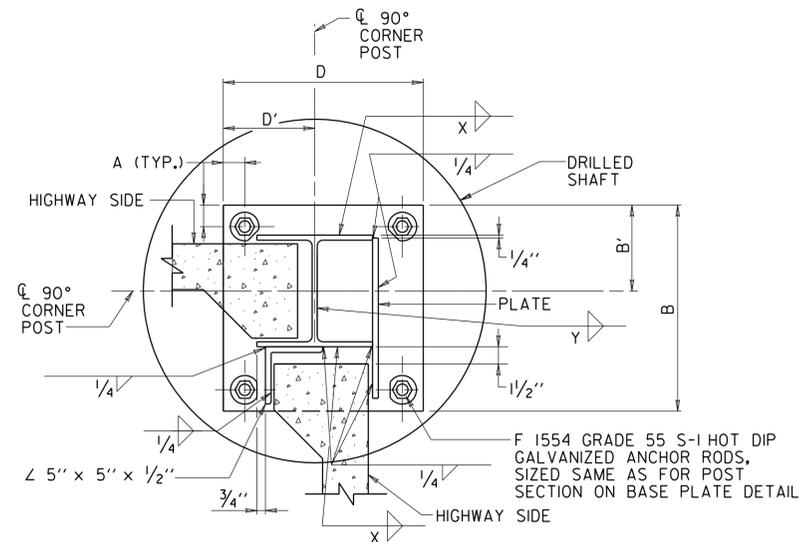
ELASTOMERIC SHIM DETAILS
SCALE : 1/2" = 1'-0"

SECTION E-E

DETAIL NO.	NB-GM-101	OFFICE OF STRUCTURES
APPROVAL		GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT
DIRECTOR OFFICE OF STRUCTURES		STEEL POST DETAILS
DATE:		SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
		DRAWING NO. GMNB-5 OF 11 SHEET NO. X OF X



ANCHOR PLATE DETAIL
SCALE : 1/2" = 1'-0"



NOTES:
PROVIDE POST CAPS (1/4" PL) FOR 90° CORNER POSTS SIMILAR TO END POST DETAIL.

CORNERS OTHER THAN 90° SHALL BE DESIGNED BY THE CONTRACTOR AND DETAILED IN THE SHOP DRAWINGS.

BASE PLATE SHALL BE CENTERED ON DRILLED SHAFT.

ALL 90° CORNER POSTS SHALL BE INSTALLED ON 3'-0" DIAMETER (MINIMUM) DRILLED SHAFTS.

90° CORNER DETAIL
SCALE : 1/2" = 1'-0"

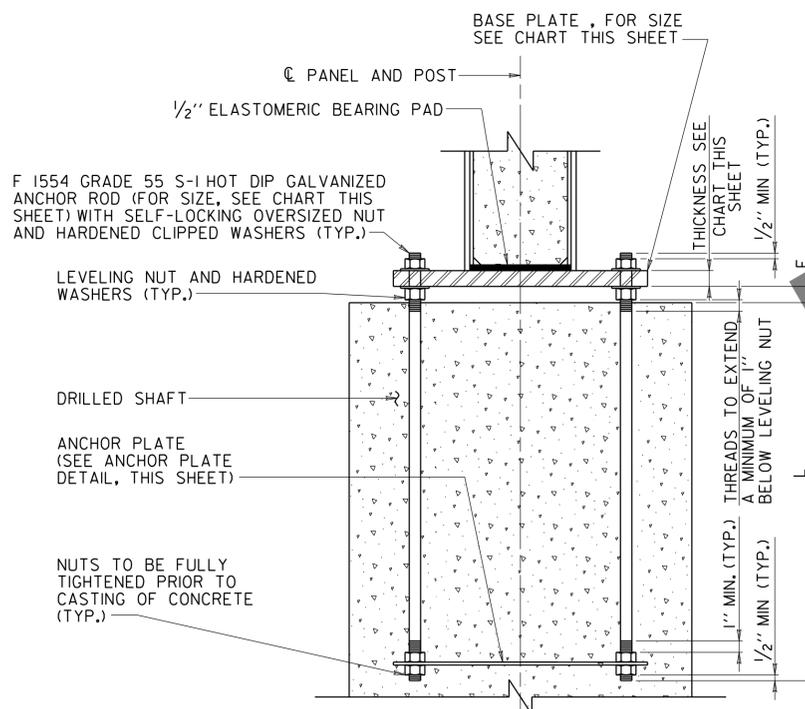
ANCHOR PLATE							
POST SPACING (S)	BARRIER HEIGHT (H)	THICKNESS	DIAMETER HOLE	C	B	D	
12'	H ≤ 20'	1/4"	1 9/16"	1 9/16"	1'-6 5/8"	10 5/8"	FOR TYPICAL POST
	20' < H ≤ 22'	1/4"	1 13/16"	1 7/8"	1'-6 1/2"	1'-7 1/4"	FOR 90 DEGREE CORNER POST
						10 1/2"	FOR TYPICAL POST
22 < H ≤ 24'	1/4"	1 13/16"	1 7/8"	1'-8 1/2"	10 1/2"	FOR TYPICAL POST	
16'	H ≤ 20'	1/4"	1 9/16"	1 7/8"	1'-7 1/2"	10 1/2"	FOR TYPICAL POST
	20' < H ≤ 22'	1/4"	1 9/16"	1 7/8"	1'-7 1/2"	1'-7 1/4"	FOR 90 DEGREE CORNER POST
						10 1/2"	FOR TYPICAL POST
22 < H ≤ 24'	1/4"	2 1/16"	2 3/16"	1'-8 7/8"	11 7/8"	FOR TYPICAL POST	
20'	H ≤ 20'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	11 7/8"	FOR TYPICAL POST
	20' < H ≤ 22'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	1'-6 7/8"	FOR 90 DEGREE CORNER POST
						11 7/8"	FOR TYPICAL POST
22 < H ≤ 24'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	11 7/8"	FOR TYPICAL POST	
20'	H ≤ 20'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	11 7/8"	FOR TYPICAL POST
	20' < H ≤ 22'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	1'-6 7/8"	FOR 90 DEGREE CORNER POST
						11 7/8"	FOR TYPICAL POST
22 < H ≤ 24'	1/4"	2 1/16"	2 3/16"	1'-9 7/8"	11 7/8"	FOR TYPICAL POST	

BASE PLATE											
S	BARRIER HEIGHT (H)	B	D	THICKNESS	ANCHOR ROD DIAMETER	DIAMETER HOLE	A	F	X	Y	L
12'	H ≤ 20'	1'-8"	1'-0"	1 1/2"	1/4"	1 9/16"	2 1/4"	2 1/8"	3/8"	3/8"	2'-9"
	20' < H ≤ 22'	1'-8"	1'-0"	1 3/4"	1/2"	1 9/16"	2 5/8"	2 3/8"	3/8"	3/8"	2'-9"
	22 < H ≤ 24'	1'-10"	1'-0"	1 3/4"	1/2"	1 9/16"	2 5/8"	2 3/8"	3/8"	3/8"	2'-9"
16'	H ≤ 20'	1'-9"	1'-0"	1 3/4"	1/2"	1 9/16"	2 5/8"	2 3/8"	3/8"	3/8"	2'-9"
	20' < H ≤ 22'	1'-9"	1'-0"	1 3/4"	1/2"	1 9/16"	2 5/8"	2 3/8"	1/2"	3/8"	2'-9"
	22 < H ≤ 24'	2'-0"	1'-2"	2"	1 3/4"	2 1/16"	3 1/4"	2 5/8"	9/16"	3/8"	2'-11"
20'	H ≤ 20'	2'-0"	1'-2"	2"	1 3/4"	2 1/16"	3 1/4"	2 5/8"	1/2"	3/8"	2'-11"
	20' < H ≤ 22'	2'-0"	1'-2"	2 1/4"	1 3/4"	2 1/16"	3 1/4"	2 5/8"	9/16"	3/8"	2'-11"
	22 < H ≤ 24'	2'-0"	1'-2"	2 1/4"	1 3/4"	2 1/16"	3 1/4"	2 5/8"	11/16"	3/8"	2'-11"

NOTES:
A 3/8" CONNECTION TEMPLATE * WITH HOLES AND OVERSIZED NUTS SHALL BE USED AS A TEMPORARY CASTING TEMPLATE ON TOP OF THE CAISSONS TO INSURE THE ANCHOR RODS ARE PROPERLY ALIGNED AND PLUMB. THIS PLATE WILL THEN BE REMOVED TO ALLOW PLACEMENT OF BASE PLATE. ALL NUTS SHALL BE FULLY TIGHTENED PRIOR TO CASTING OF CONCRETE. SEE SHEET NO. GMNB 7 OF 11 FOR DETAILS.

WHEN PLACING CONCRETE, CONTRACTOR SHALL USE CARE NOT TO DROP CONCRETE ON ANCHOR PLATE.

* ANCHOR ROD SPACING FOR 90° CORNER POSTS IS DIFFERENT THAN TYPICAL POST.

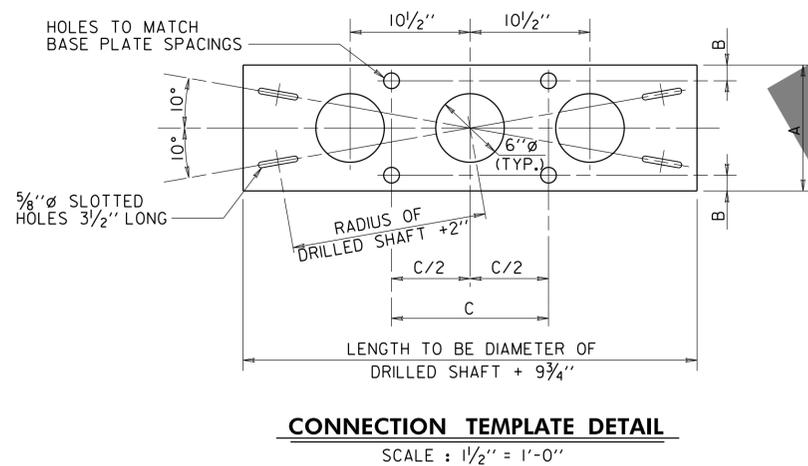
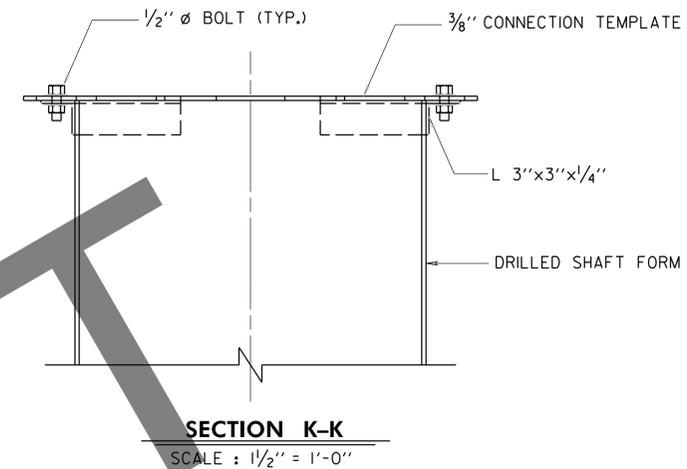
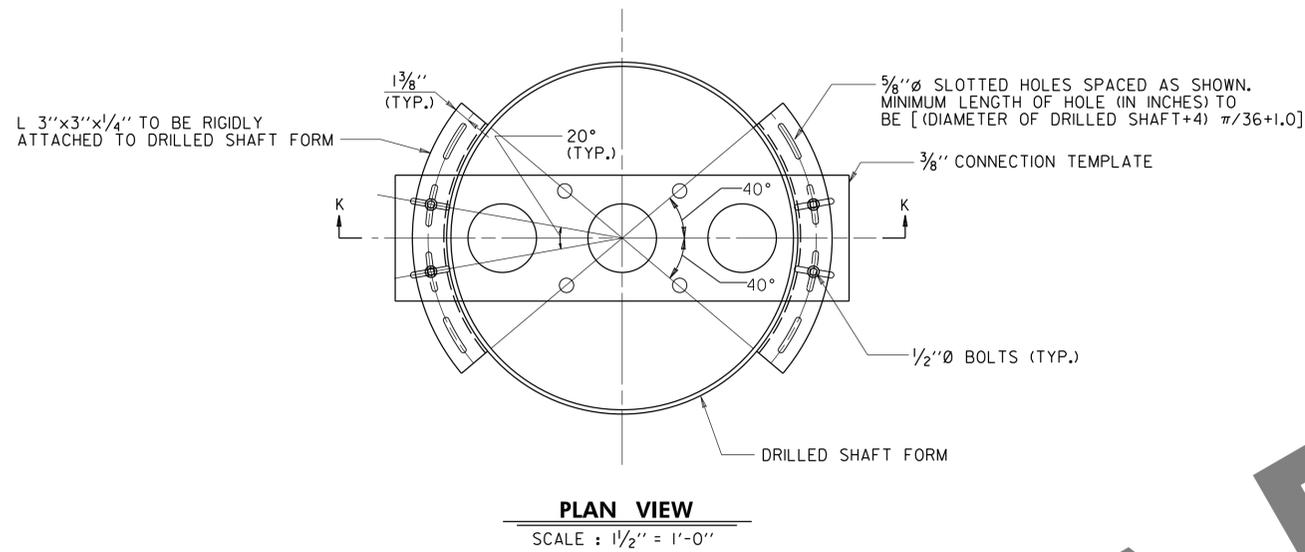


SECTION F-F

BASE PLATE DETAIL
SCALE : 1/2" = 1'-0"

90 DEGREE CORNER DETAIL							
POST SPACING (S)	BARRIER HEIGHT (H)	B	B'	D	D'	PLATE	A
12'	H ≤ 20'	1'-8"	9 1/2"	1'-8 5/8"	10 5/16"	1'-2" x 1/2"	2 1/4"
	20' < H ≤ 22'	1'-8"	9 1/2"	1'-8 5/8"	10 5/16"	1'-2" x 1/2"	2 5/8"
	22 < H ≤ 24'	1'-10"	10 1/2"	1'-8 3/4"	10 3/8"	1'-2" x 1/2"	2 5/8"
16'	H ≤ 20'	1'-9"	9 1/2"	1'-8 3/4"	10 3/8"	1'-2" x 1/2"	2 5/8"
	20' < H ≤ 22'	1'-9"	10 1/2"	1'-10"	11"	1'-2" x 1/2"	2 5/8"
	22 < H ≤ 24'	2'-0"	11 1/2"	1'-11"	11 1/2"	1'-2" x 1/2"	3 1/4"
20'	H ≤ 20'	2'-0"	10 1/2"	1'-8 3/4"	10 3/8"	1'-3" x 1/2"	3 1/4"
	20' < H ≤ 22'	2'-0"	11"	1'-9"	10 1/2"	1'-3" x 1/2"	3 1/4"
	22 < H ≤ 24'	2'-0"	11 3/4"	1'-11 1/2"	11 3/4"	1'-3" x 1/2"	3 1/4"

DETAIL NO.	NB-GM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT
DATE:	VERSION	SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA	
	DRAWING NO. GMNB-6 OF 11	SHEET NO. X OF X

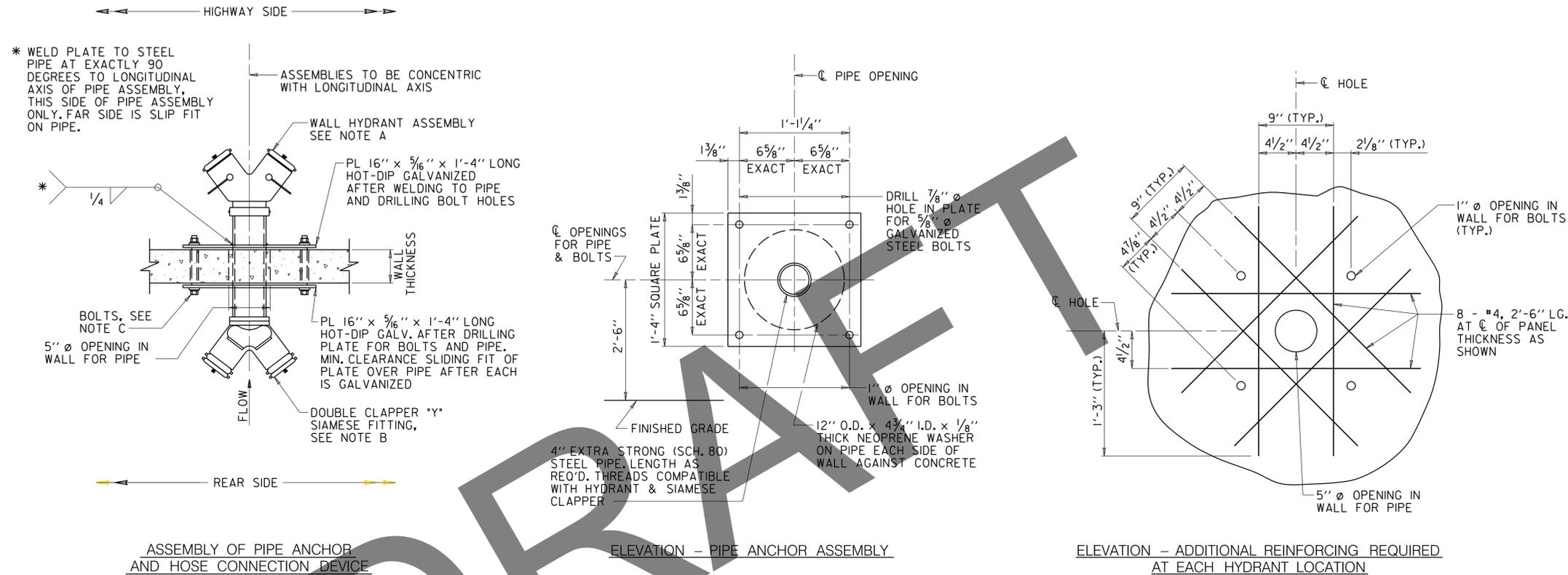


CONNECTION TEMPLATE DETAILS							
POST SPACING (S)	BARRIER HEIGHT (H)	DIAMETER HOLES	C	C/2	B	A	
12'	H ≤ 20'	1 3/8"	1'-3 1/2"	7 3/4"	1 1/4"	10"	FOR TYPICAL POST
	20' < H ≤ 22'	1 5/8"	1'-2 3/4"	7 3/8"	1 1/2"	1'-6 5/8"	FOR 90 DEGREE CORNER POST
	22' < H ≤ 24'	1 5/8"	1'-4 3/4"	8 3/8"	1 1/2"	9 3/4"	FOR TYPICAL POST
16'	H ≤ 20'	1 5/8"	1'-3 3/4"	7 7/8"	1 1/2"	1'-6 1/2"	FOR 90 DEGREE CORNER POST
	20' < H ≤ 22'	1 5/8"	1'-3 3/4"	7 7/8"	1 1/2"	9 3/4"	FOR TYPICAL POST
	22' < H ≤ 24'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	1'-7 3/4"	FOR 90 DEGREE CORNER POST
20'	H ≤ 20'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	11"	FOR TYPICAL POST
	20' < H ≤ 22'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	1'-8"	FOR 90 DEGREE CORNER POST
	22' < H ≤ 24'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	1'-5 3/4"	FOR 90 DEGREE CORNER POST
20'	H ≤ 20'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	11"	FOR TYPICAL POST
	20' < H ≤ 22'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	1'-6"	FOR 90 DEGREE CORNER POST
	22' < H ≤ 24'	1 7/8"	1'-5 1/2"	8 3/4"	1 3/4"	1'-8 1/2"	FOR 90 DEGREE CORNER POST

NOTES:

- CONNECTION TEMPLATE DETAILS ARE PROVIDED TO INSURE THAT THE ANCHOR RODS ARE CAST PLUMB AND IN THEIR PROPER ALIGNMENT. IF A DIFFERENT METHOD OR CONFIGURATION IS DESIRED BY THE CONTRACTOR, THEN THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS SHOWING PROPOSED METHOD AND OBTAIN WRITTEN APPROVAL PRIOR TO ITS USE.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ANCHOR RODS BEING CAST PLUMB AND IN THEIR PROPER ALIGNMENT REGARDLESS OF THE TEMPLATE METHOD USED. MISSALIGNED OR OUT OF PLUMB BOLTS WILL BE REASON FOR REJECTION OF THE DRILLED SHAFT AND THE DRILLED SHAFT SHALL BE MODIFIED AS DIRECTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE ADMINISTRATION.
- NO SHOP OR FIELD BENDING OF THE ANCHOR BOLTS WILL BE ALLOWED.
- THIS TEMPLATE SHALL ONLY BE USED TO PROPERLY POSITION BOLTS, AFTER CONCRETE HAS SET TEMPLATE SHALL BE REMOVED.

DETAIL NO.	OFFICE OF STRUCTURES	
NB-GM-101	 MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION	
APPROVAL	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT	
DIRECTOR OFFICE OF STRUCTURES	STEEL POST DETAILS - 3	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
1.0	DRAWN BY SHA	
	CHECKED BY SHA	
DRAWING NO. GMNB-7 OF 11		SHEET NO. X OF X



* WELD PLATE TO STEEL PIPE AT EXACTLY 90 DEGREES TO LONGITUDINAL AXIS OF PIPE ASSEMBLY. THIS SIDE OF PIPE ASSEMBLY ONLY. FAR SIDE IS SLIP FIT ON PIPE.

* 1/4"

BOLTS, SEE NOTE C
5" Ø OPENING IN WALL FOR PIPE

ASSEMBLIES TO BE CONCENTRIC WITH LONGITUDINAL AXIS

WALL HYDRANT ASSEMBLY SEE NOTE A

PL 16" x 5/16" x 1'-4" LONG HOT-DIP GALVANIZED AFTER WELDING TO PIPE AND DRILLING BOLT HOLES

WALL THICKNESS

PL 16" x 5/16" x 1'-4" LONG HOT-DIP GALV. AFTER DRILLING PLATE FOR BOLTS AND PIPE. MIN. CLEARANCE SLIDING FIT OF PLATE OVER PIPE AFTER EACH IS GALVANIZED

DOUBLE CLAPPER "Y" SIAMESE FITTING, SEE NOTE B

FLOW

REAR SIDE

PIPE OPENING

1'-1 1/4" EXACT

1 3/8" EXACT

6 5/8" EXACT

6 5/8" EXACT

1 3/8" EXACT

6 5/8" EXACT

1'-4" SQUARE PLATE

2'-6"

FINISHED GRADE

4" EXTRA STRONG (SCH. 80) STEEL PIPE, LENGTH AS REQ'D. THREADS COMPATIBLE WITH HYDRANT & SIAMESE CLAPPER

DRILL 7/8" Ø HOLE IN PLATE FOR 5/8" Ø GALVANIZED STEEL BOLTS

1" Ø OPENING IN WALL FOR BOLTS

12" O.D. x 4 3/4" I.D. x 1/8" THICK NEOPRENE WASHER ON PIPE EACH SIDE OF WALL AGAINST CONCRETE

OPENINGS FOR PIPE & BOLTS

HOLE

9" (TYP.)

4 1/2" 4 1/2" 2 1/8" (TYP.)

9" (TYP.)

4 7/8" (TYP.) 4 1/2" 4 1/2"

1" Ø OPENING IN WALL FOR BOLTS (TYP.)

8 - #4, 2'-6" LG. AT Ø OF PANEL THICKNESS AS SHOWN

5" Ø OPENING IN WALL FOR PIPE

NOTES:

- A. WALL HYDRANT ASSEMBLY SHALL BE AKRON BRASS CO. NO. 1582, ELKHART BRASS MFG. CO., INC. NO. B-97 OR BADGER-POWHATAN BRASS AND IRON WORKS NO. 07-342 WALL HYDRANT WYE WITH BALL VALVE WITH ROCKERLUGS, TWO PLASTIC CAPS WITH CHAINS, PIPE FEMALE INLET AND TWO 2 1/2" THREADED MALE OUTLETS (NST). NO ESCUTCHEON PLATE. CAST BRASS FINISH.
- B. DOUBLE CLAPPER "Y" SIAMESE SHALL BE BADGER-POWHATAN BRASS AND IRON WORKS NO. 04-172, AKRON BRASS CO. NO. 1262 OR ELKHART BRASS MFG. CO., INC. NO. 12-X SIAMESE BODY WITH TWO BRASS PLUGS AND CHAINS. 4" PIPE FEMALE OUTLET AND TWO 2 1/2" THREADED FEMALE INLETS (NST). NO ESCUTCHEON PLATE. CAST BRASS FINISH.
- C. 5/8" Ø HOT-DIP GALVANIZED STEEL BOLT WITH 2-FLAT WASHERS, 1-LOCK WASH, HEX H. & N. ALL HOT-DIP GALVANIZED. CHASE THREADS IN NUT AFTER GALV. (TYP.) BOLT LENGTH AS REQUIRED.

STANDARD FIRE DEPARTMENT CONNECTION
SCALE : NONE

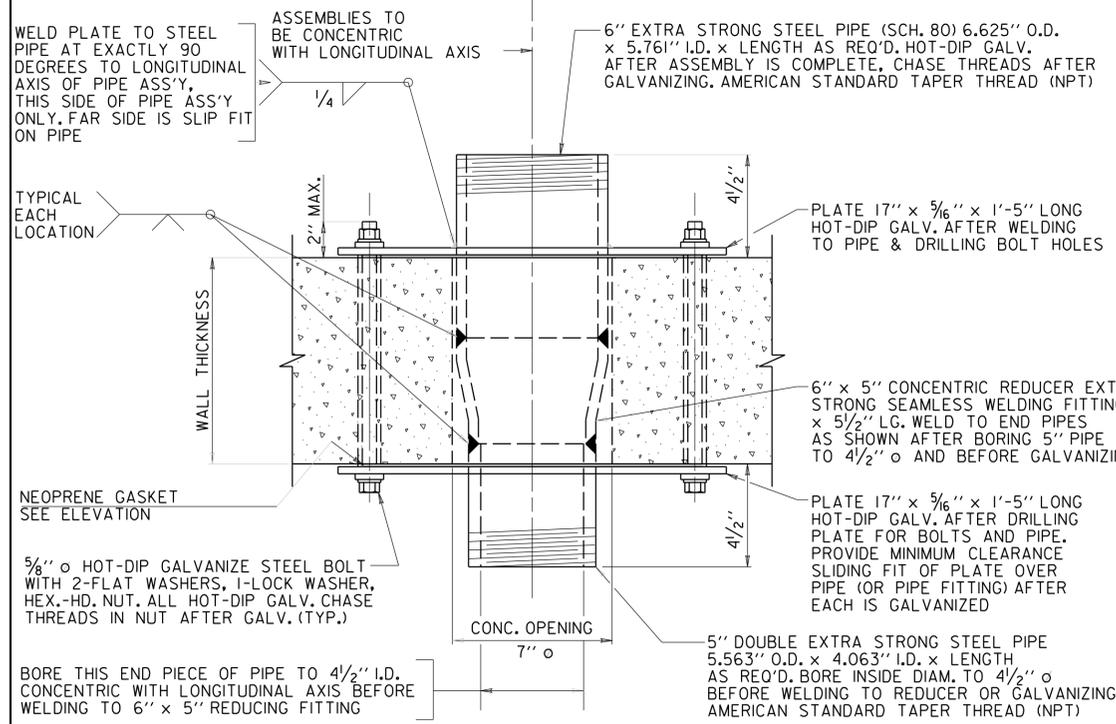
THIS SHEET NOT APPLICABLE FOR CONTRACTS IN ANNE ARUNDEL OR BALTIMORE COUNTIES.

DETAIL NO.	NB-GM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT
DATE:	DATE <MONTH, YEAR>	CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. 9 OF 11		SHEET NO. X OF X

STRUCTURE INVENTORY NO. X

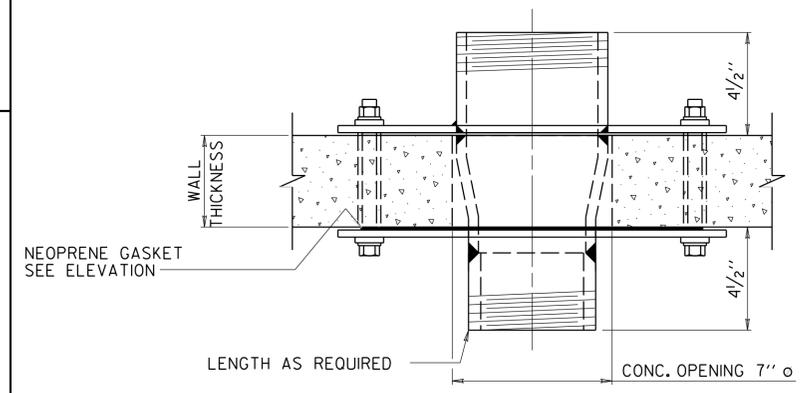
SURVEY BOOK NO. X

FILE: NB-GM-101_9.dgn
PLOTFILE: Tuesday, September 24, 2019 AT 04:12 PM
BY: KJash



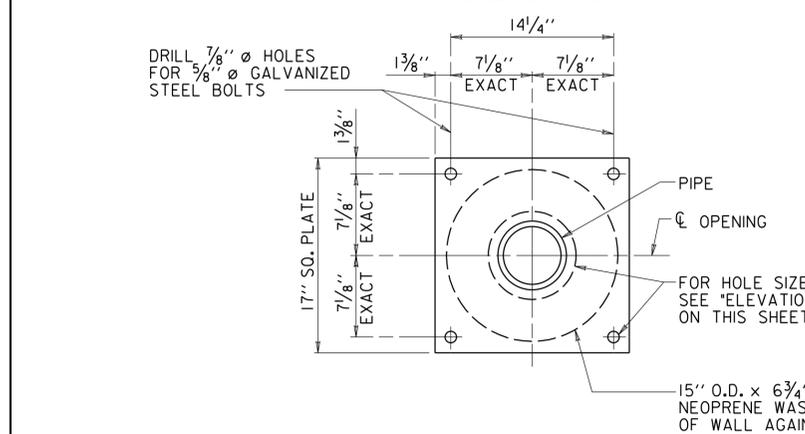
PLAN - PIPE ANCHOR THROUGH WALL

SCALE : 3" = 1'-0"



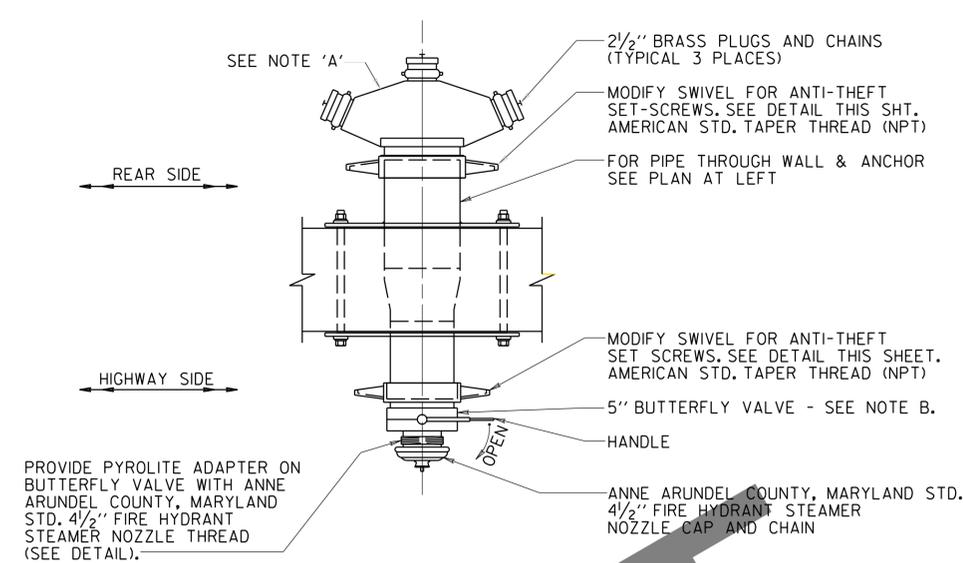
PLAN - PIPE ANCHOR THROUGH WALL

SCALE : 3" = 1'-0"



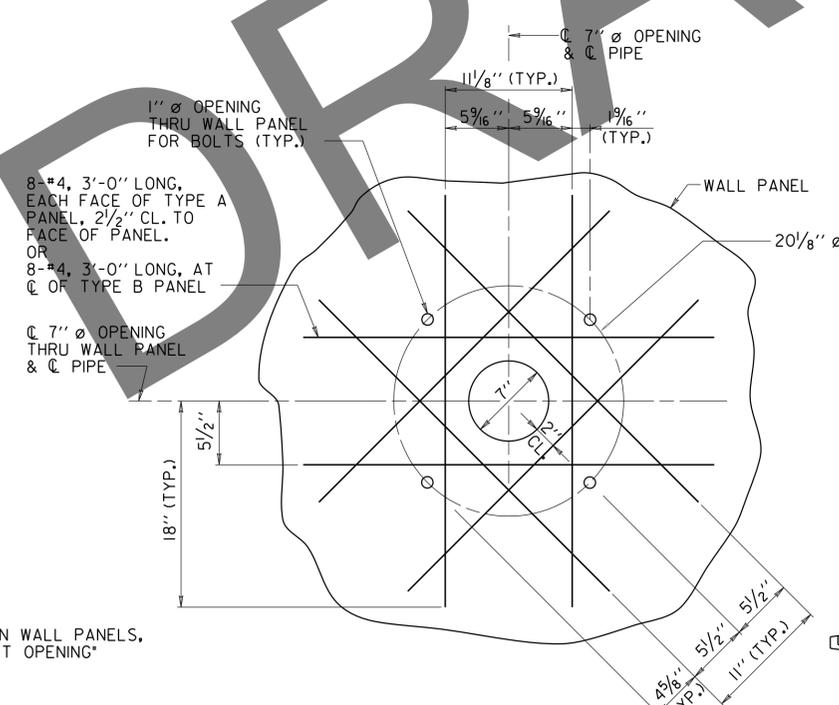
ELEVATION - PIPE ANCHOR ASSEMBLY

SCALE : 1 1/2" = 1'-0"



PLAN AT HYDRANT

SCALE : 1 1/2" = 1'-0"



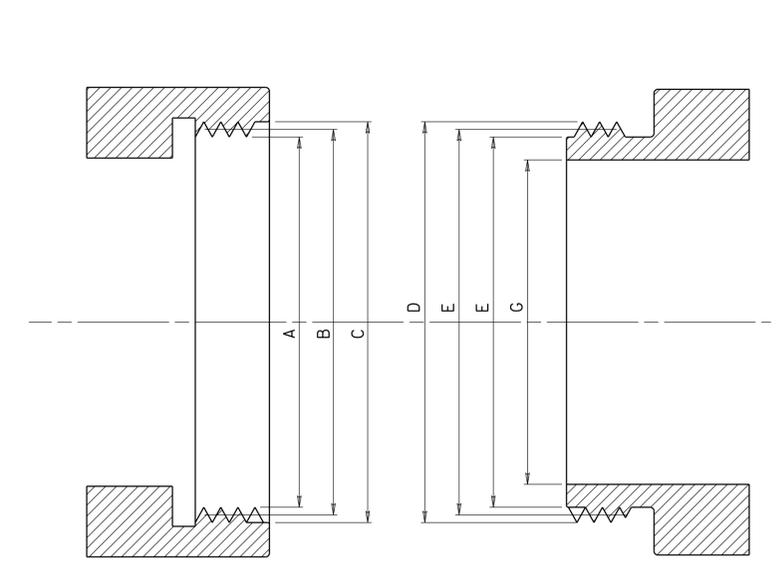
ELEVATION AT OPENINGS

SCALE : 1 1/2" = 1'-0"



SWIVEL ANTI-THEFT DEVICE

SCALE : NONE



THREAD FORM 'V'						
FEMALE			MALE			
A	B	C	D	E	E	G
MINOR DIA.	PITCH DIA.	MAJOR DIA.	MAJOR DIA.	PITCH DIA.	MINOR DIA.	COUPLING I.D.
5.113	5.325	5.546	5.477 x	5.260	5.044	4 1/2"
5.103 x	5.320	5.536	5.467	5.255	5.034	

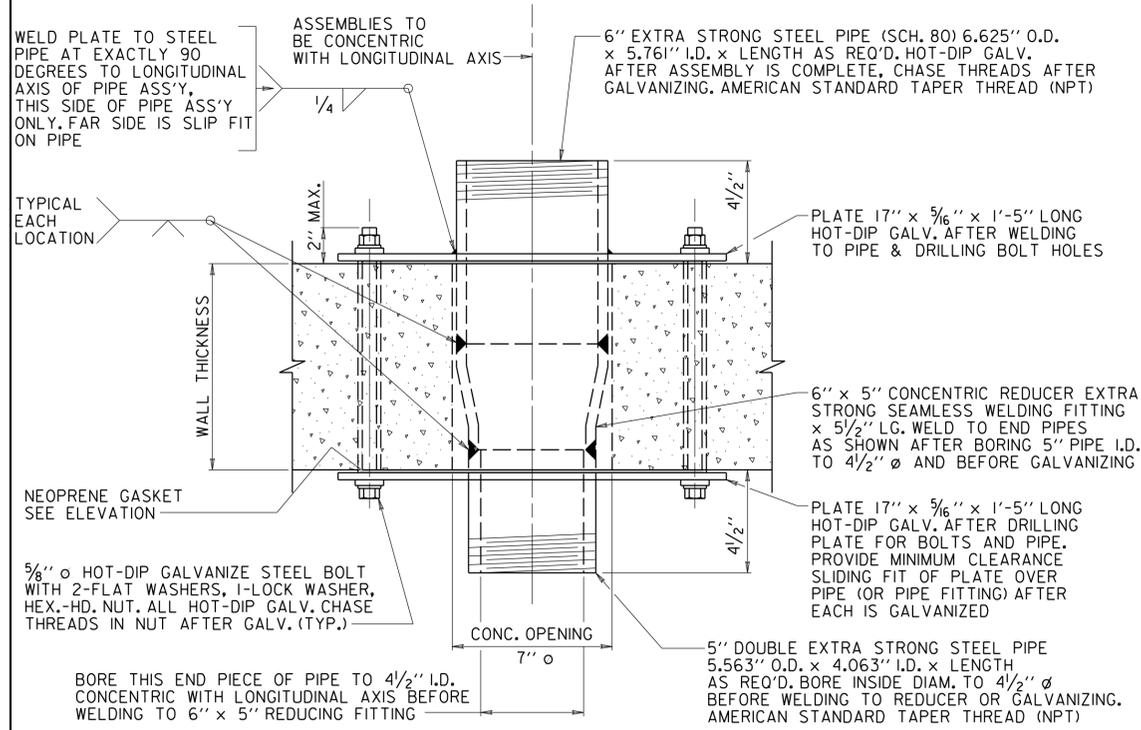
ANNE ARUNDEL COUNTY
4 1/2" THREAD DETAIL

SCALE : NONE

GENERAL NOTES

- MATERIALS AND SPECIFICATIONS:**
- | | | |
|---------------|-------|---|
| STEEL PLATE | A 709 | GRADE 36 |
| BOLTS | A 307 | GRADE A |
| PIPE | A 53 | SEAMLESS, GR. B |
| PIPE FITTINGS | A 234 | WROUGHT CARBON STEEL, SEAMLESS |
| GALVANIZING | A 123 | HOT-DIP GALV. FOR STEEL PLATE, ETC. |
| | A 153 | HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC. |
- WELDING AMERICAN WELDING SOCIETY AWS D1.1
- WORKING DRAWINGS:**
- WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

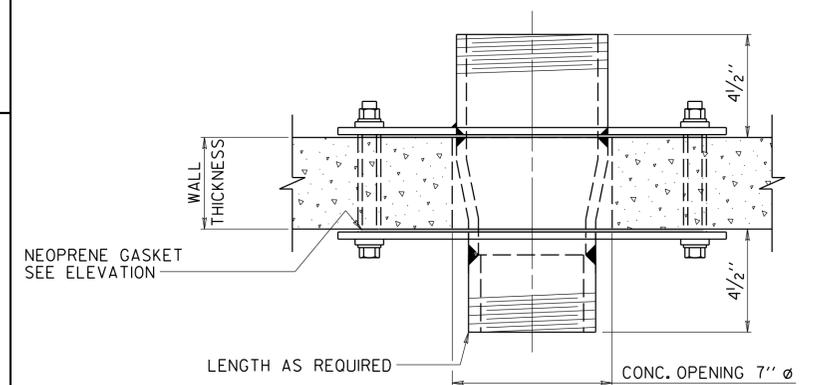
DETAIL NO.	OFFICE OF STRUCTURES	
NB-GM-101	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT	
APPROVAL		
DIRECTOR OFFICE OF STRUCTURES	HYDRANT CONNECTION (ANNE ARUNDEL COUNTY)	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
	DRAWN BY SHA	
	CHECKED BY SHA	
1.0	DRAWING NO. GMBN-10 OF 11	SHEET NO. X OF X



(TYPE A - WALLS 8" OR MORE IN THICKNESS)

PLAN - PIPE ANCHOR THROUGH WALL

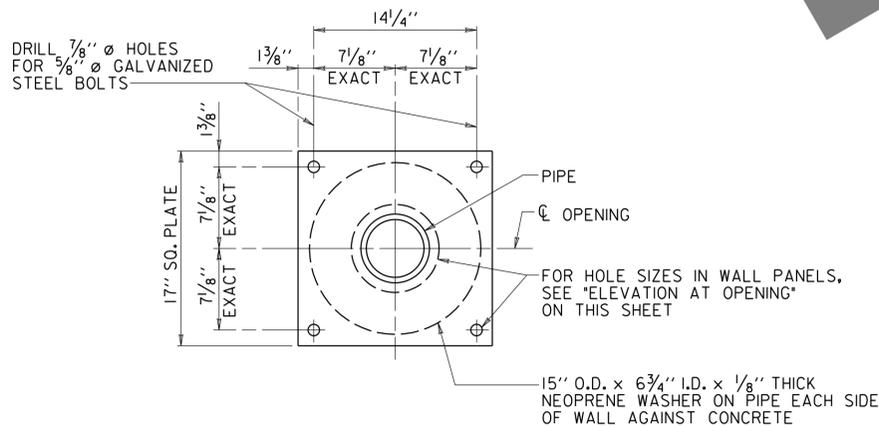
SCALE : 3" = 1'-0"



(TYPE B - WALLS 4" TO LESS THAN 8" IN THICKNESS)

PLAN - PIPE ANCHOR THROUGH WALL

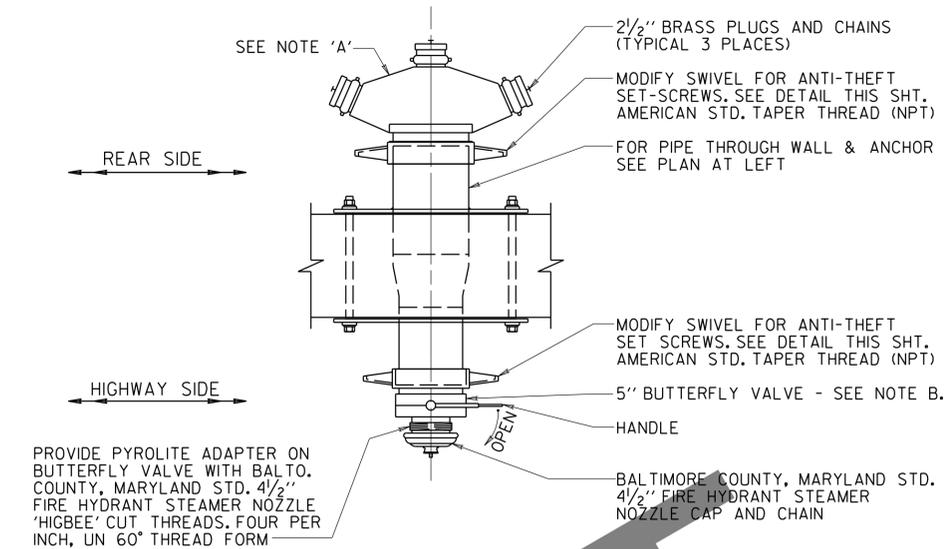
SCALE : 3" = 1'-0"



HIGHWAY SIDE SHOWN

ELEVATION - PIPE ANCHOR ASSEMBLY

SCALE : 1/2" = 1'-0"



NOTE 'A'

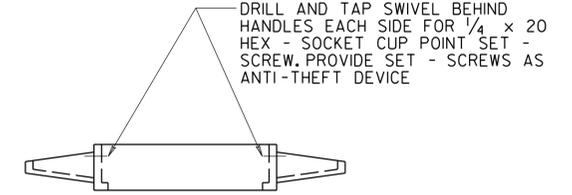
3 - WAY CLAPPER SIAMESE WITH THREE 2 1/2" FEMALE BY ONE 6" FEMALE - PYROLITE WITH PLUGS AND CHAINS AS NOTED, AND DRAIN VALVE. UNIT SHALL BE LIKE AKRON BRASS CO. NO. 2256, BADGER-POWATAN BRASS AND IRON WORKS NO. 04-168 OR J.W. MOON, INC. NO. 1372.

NOTE 'B'

BUTTERFLY VALVE WITH QUARTER - TURN HANDLE, FREE - FLOATING SELF - CENTERING DISC, MOLDED RUBBER SEAT - 5" VALVE SIZE. UNIT SHALL BE LIKE AKRON BRASS CO. NO. 7960, J.W. MOON, INC. NO. 760 VHK, OR ELKHART BRASS MFG. CO., INC. NO. 84 (WITH EXTENSIONS). CAP AS NOTED BELOW. PYROLITE MALE ADAPTER WITH "BALTIMORE" FORM OF THREAD ON OUTLET END OF VALVE ONLY.

PLAN AT HYDRANT

SCALE : 1/2" = 1'-0"



(FOR 3-WAY CLAPPER & BUTTERFLY VALVE)

SWIVEL ANTI - THEFT DEVICE

SCALE : NONE

GENERAL NOTES

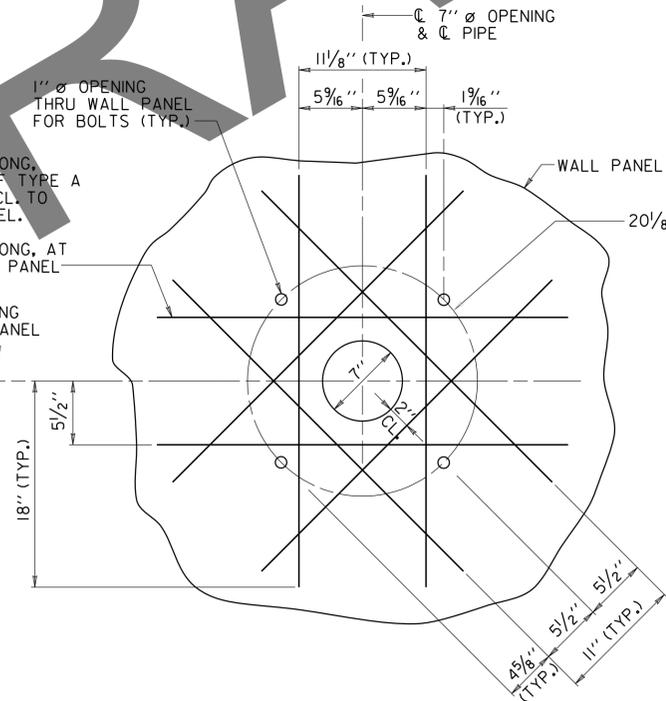
MATERIALS AND SPECIFICATIONS:

STEEL PLATE	A 709	GRADE 36
BOLTS	A 307	GRADE A
PIPE	A 53	SEAMLESS, GR. B
PIPE FITTINGS	A 234	WROUGHT CARBON STEEL, SEAMLESS
GALVANIZING	A 123	HOT-DIP GALV. FOR STEEL PLATE, ETC.
	A 153	HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC.
WELDING	AMERICAN WELDING SOCIETY AWS D1.1	

WORKING DRAWINGS:

WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

DRAFT



NOTE: OPENINGS THRU WALL PANELS MUST BE 90 DEGREES WITH THE PLANE OF THE PANELS.

ELEVATION AT OPENINGS

SCALE : 1/2" = 1'-0"

DETAIL NO.	OFFICE OF STRUCTURES	
NB-GM-101	GROUND MOUNTED NOISE BARRIER DETAILS 24' MAXIMUM HEIGHT	
APPROVAL		
DIRECTOR OFFICE OF STRUCTURES	HYDRANT CONNECTION (BALTIMORE COUNTY)	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
	DRAWN BY SHA	
	CHECKED BY SHA	
1.0	DRAWING NO. GMBN-11 OF 11	SHEET NO. X OF X

Chapter 10 - Noise Barriers

SECTION 02

WALL MOUNTED NOISE BARRIERS (NB-WM)

DRAFT

GENERAL NOTES – RETAINING WALL MOUNTED CONCRETE NOISE BARRIER

SPECIFICATIONS: MDOT SHA STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, DATED JULY 20XX.

DESIGN: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.

LOADING: THE DESIGN WIND LOAD FOR THIS GROUND MOUNTED NOISE BARRIER SYSTEM IS 54 PSF APPLIED PERPENDICULAR TO THE BARRIER IN EACH DIRECTION.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED FOR A 20'-0" MAXIMUM RETAINING WALL HEIGHT.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED FOR THE ADDITIONAL DEAD LOAD MOMENT CAUSED BY A TWO DEGREE (2°) ROTATION OF THE PANELS AND POSTS AT THE TOP OF THE RETAINING WALL.

CONCRETE: CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE:
 f'c = 3000 psi FOR ELEMENTS USING MIX NO. 3
 f'c = 3000 psi FOR ELEMENTS USING MIX NO. 4
 f'c = 4000 psi FOR ELEMENTS USING MIX NO. 6
 f'c = 5000 psi FOR PRECAST ELEMENTS USING MIX NO. 6

ALL CONCRETE FOR PRECAST CONCRETE ELEMENTS SHALL BE MIX NO. 6 (4500 PSI)

WHEN EXPOSED AGGREGATE IS SPECIFIED THE COARSE AGGREGATE SHALL BE AASHTO SIZE NO. 57 WASHED QUARTZ GRAVEL.

REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A 615 GRADE 60, WITH A YIELD STRENGTH FOR DESIGN OF fy = 60 000 psi.

WELDED WIRE REINFORCEMENT (WWR) SHALL CONFORM TO ASTM A 497 WITH A YIELD STRENGTH FOR DESIGN OF fy = 70 000 psi.

ALL SPLICES, NOT SHOWN, SHALL BE LAPPED AS PER BAR LAP CHARTS.

REINFORCING STEEL AND WELDED WIRE REINFORCEMENT THAT ARE WITHIN 10 FT OF THE OUTSIDE EDGE OF PAVED SHOULDER, MEASURED ALONG ANY TRAJECTORY SHALL BE EPOXY COATED.

ADDITIONAL REINFORCING WHICH MAY BE REQUIRED FOR HANDLING IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBMITTED FOR APPROVAL WITH THE WORKING DRAWINGS.

STRUCTURAL STEEL: STRUCTURAL STEEL FOR SHAPES, POSTS, AND BASE PLATES SHALL CONFORM TO ASTM A 709 GRADE 50W.

STRUCTURAL STEEL FOR ANCHOR PLATES SHALL CONFORM TO ASTM A 36. ANCHOR RODS SHALL BE ASTM F 1554 GRADE 55 S-1, NUTS SHALL BE CARBON AND ALLOY STEEL ASTM A 563, WASHERS FOR THE TOP OF THE BASE PLATE SHALL BE HARDENED CLIPPED STEEL WASHERS ASTM F 436. ALL OTHER WASHERS SHALL BE HARDENED STEEL WASHERS ASTM F 436. ANCHOR PLATES, ANCHOR RODS, NUTS, AND WASHERS SHALL BE HOT DIPPED GALVANIZED IN CONFORMANCE WITH ASTM A 153.

ALL WELDS SHALL CONFORM TO ANSI/AWS D11.

PRECAST CONCRETE POSTS AND PANELS: FOR PANEL AND POST SURFACE TEXTURE, COLOR TREATMENT, ANTI-GRAFFITI COATING, OR NEED FOR EPOXY COATING, SEE THE SPECIAL PROVISIONS.

FALSE JOINTS SHALL BE PROVIDED FOR CONFORMITY IN THE HORIZONTAL ALIGNMENT OF PANEL JOINTS. THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS DETAILING THE PROPOSED FALSE JOINT AND OBTAIN WRITTEN APPROVAL PRIOR TO PRODUCTION OF A SAMPLE PANEL. THE CONTRACTOR SHALL PRODUCE A 4' X 4' SAMPLE PANEL WITH THE APPROVED FALSE JOINT AND APPROPRIATE ARCHITECTURAL FINISH FOR APPROVAL PRIOR TO USE.

EXISTING STRUCTURES: ALL DIMENSIONS AFFECTED BY THE GEOMETRICS, AND/OR LOCATION OF THE EXISTING STRUCTURE SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR, BEFORE ANY CONSTRUCTION IS DONE, AND BEFORE ANY REINFORCING STEEL, ETC., IS ORDERED OR FABRICATED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUPPLY THE ENGINEER WITH ALL FIELD DIMENSIONS REQUIRED TO CHECK DETAIL DRAWINGS. THE () MARKS INDICATE EXISTING DIMENSIONS AND STATIONS THAT MAY VARY AND DO REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.

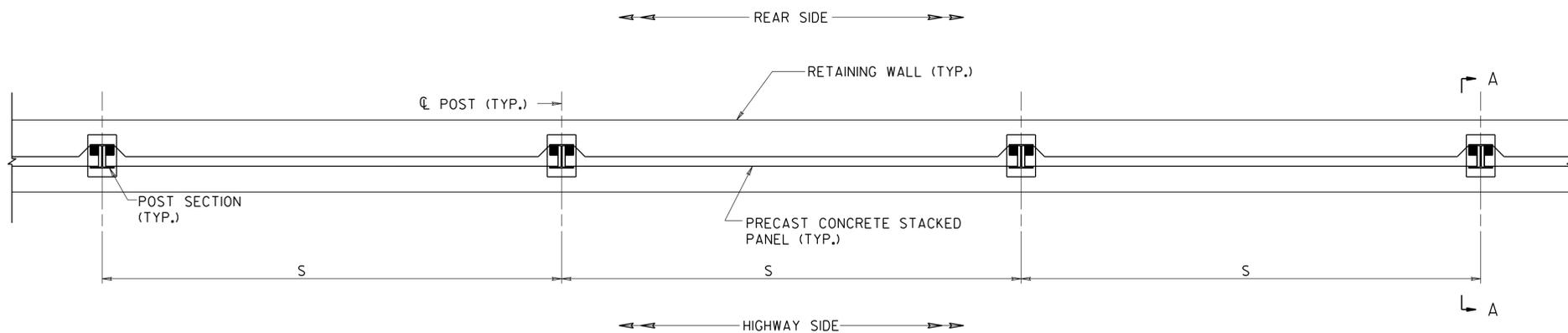
CONTRACT APPROVED OPTIONS: THE OPTIONS INDICATED BELOW WITH AN "X" ARE PERMITTED IN THIS CONTRACT.

POST SPACING:

- 12'
- 16'
- 20'

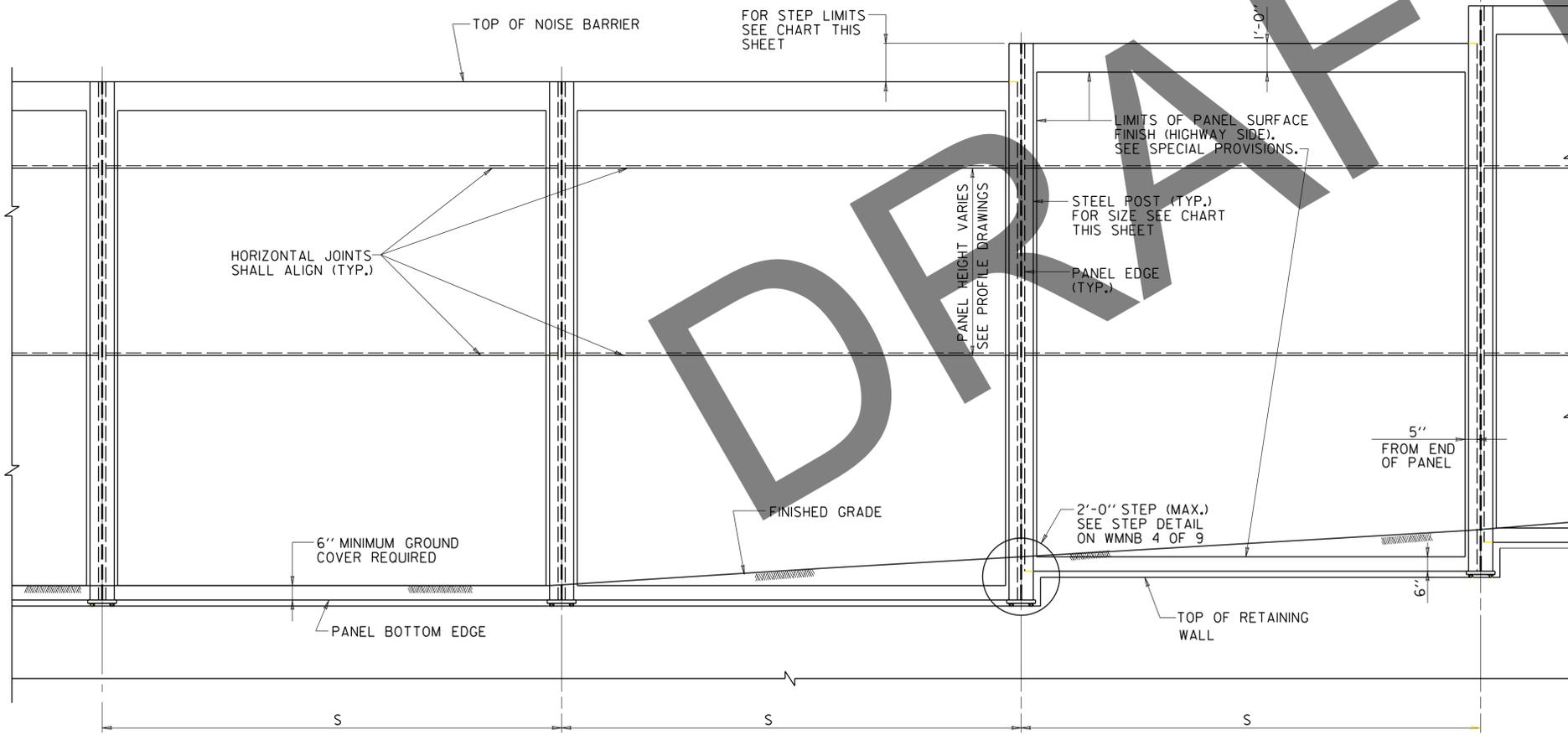
NOTE: STANDARD SHEET NOS. X AND X OF 9 NOT USED.

DETAIL NO.		OFFICE OF STRUCTURES
NB-WM-101		RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
APPROVAL	GENERAL NOTES	
_____ DIRECTOR OFFICE OF STRUCTURES	SCALE: VARIES DATE: <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>	
DATE:	DESIGNED BY: SHA _____ DRAWN BY: SHA _____ CHECKED BY: SHA _____	
VERSION	DRAWING NO. WMNB-1 OF 9 SHEET NO. X OF X	
1.0		



PLAN

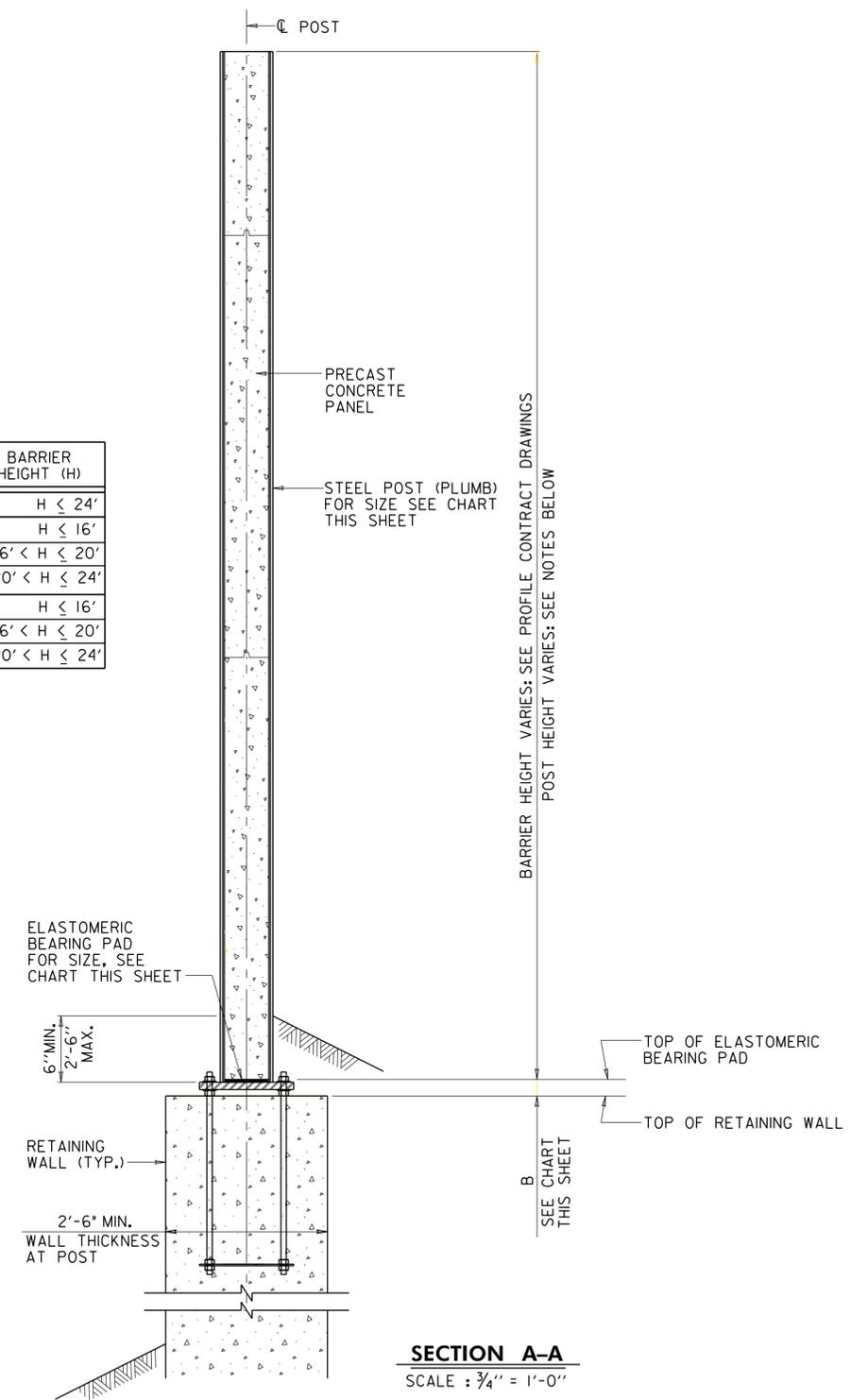
S	STEP (MAX.)	STEEL POST	ELASTOMERIC BEARING PAD	B MIN.	B MAX.	BARRIER HEIGHT (H)
12'	1'-0"	W10x60	1/2" x 7 1/2" x 8"	4 1/4"	4 3/4"	H < 24'
16'	1'-4"	W10x77	1/2" x 7 1/2" x 8"	3 7/8"	4 3/8"	H < 16'
				4 3/8"	4 7/8"	16' < H < 20'
20'	1'-8"	W10x100	1/2" x 7 1/2" x 8"	4 7/8"	5 3/8"	20' < H < 24'
				4 3/8"	4 7/8"	H < 16'
				4 7/8"	5 3/8"	16' < H < 20'
				5 3/8"	5 7/8"	20' < H < 24'



ELEVATION

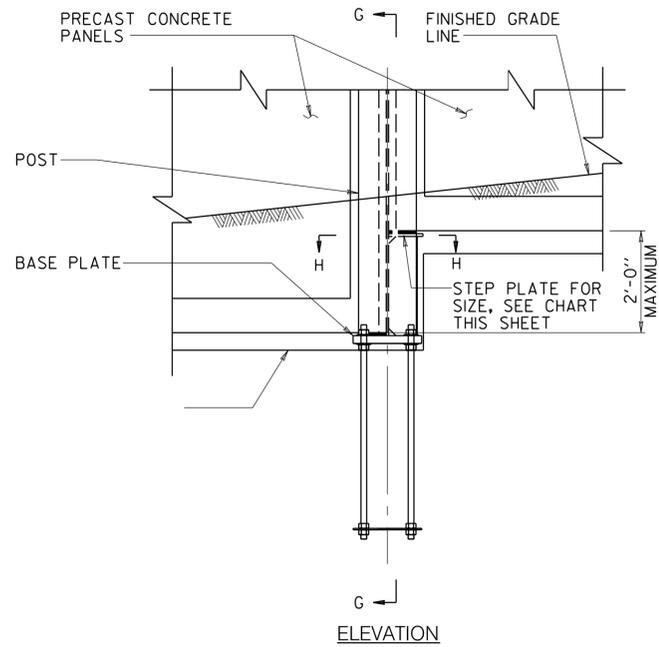
PRECAST CONCRETE NOISE BARRIER ON RETAINING WALL
SCALE : 3/8" = 1'-0"

- NOTES:**
- SEE GENERAL NOTES SHEET NO. WMNB 1 OF 9.
 - POSTS SHALL EXTEND TO THE TOP OF PANELS. IF TOP OF ADJACENT PANELS ARE AT DIFFERENT ELEVATIONS, THE POST SHALL EXTEND TO THE TOP OF THE HIGHER PANEL.
 - MAXIMUM POST HEIGHT IS 24'-0".
 - STACKED PANELS ARE OPTIONAL FOR 12'-0" POST SPACINGS.

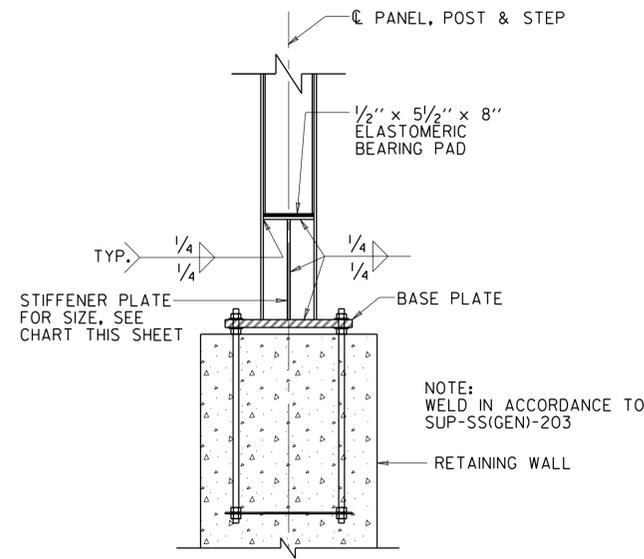


SECTION A-A
SCALE : 3/4" = 1'-0"

DETAIL NO.	NB-WM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
VERSION	1.0	TYPICAL PLAN, ELEVATION, AND SECTION
DATE:	DESIGNED BY <u>SHA</u> DRAWN BY <u>SHA</u> CHECKED BY <u>SHA</u>	SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
	DRAWING NO. WMNB-2 OF 9	SHEET NO. X OF X

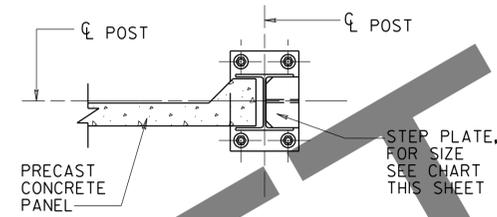


ELEVATION

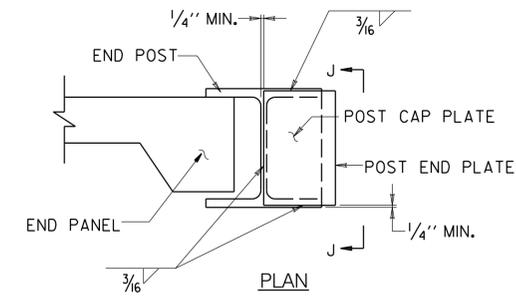


SECTION G-G

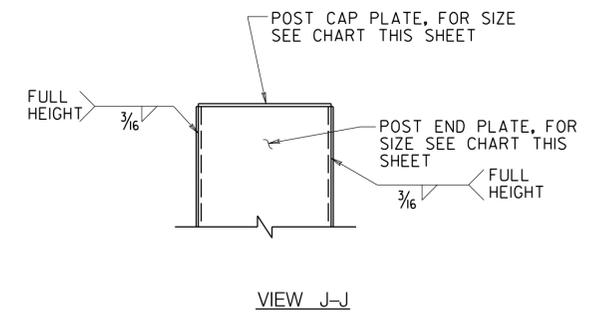
STEP DETAIL
SCALE : 3/4" = 1'-0"



SECTION H-H



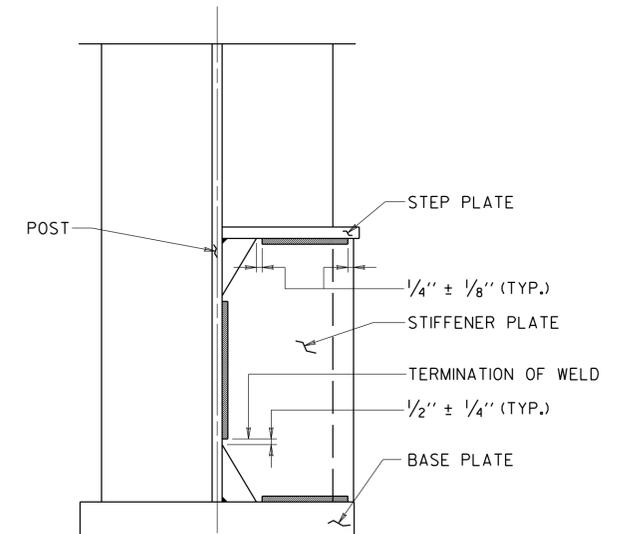
PLAN



VIEW J-J

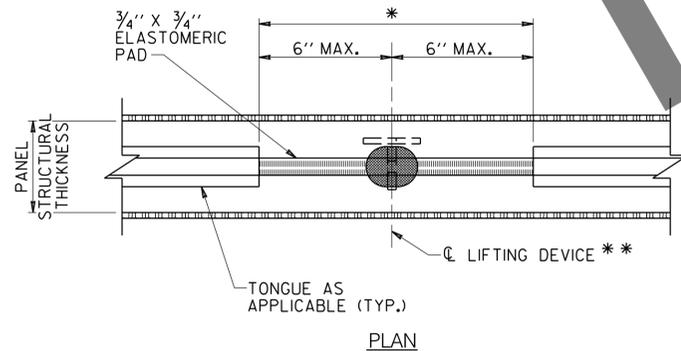
END POST DETAIL
SCALE : 1/2" = 1'-0"

PLATE DETAILS				
S	STEP PLATE	STIFFENER PLATE	POST CAP PLATE	POST END PLATE
12'	1/2" X 6"	1/2" X 5 3/4"	1/4" X 5 5/16" X 10"	1/4" X 10" X H
16'	1/2" X 6"	1/2" X 5 3/4"	1/4" X 5 5/16" X 10"	1/4" X 10" X H
20'	1/2" X 8"	1/2" X 7 3/4"	1/4" X 5 5/16" X 10"	1/4" X 10" X H



STIFFENER PLATE WELD TERMINATION DETAIL

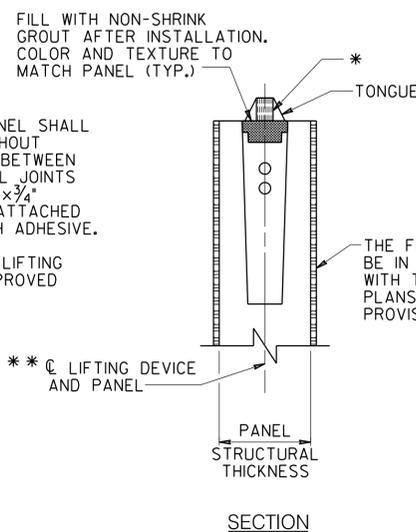
SCALE : 3' = 1'-0"



PLAN

NOTE:
USE THIS DETAIL FOR SEALING LIFTING DEVICES IN THE TOP OF THE TOP PANEL, NO ELASTOMERIC PAD REQUIRED.

LIFTING DEVICE SEAL DETAILS
SCALE: 3" = 1'-0"



SECTION

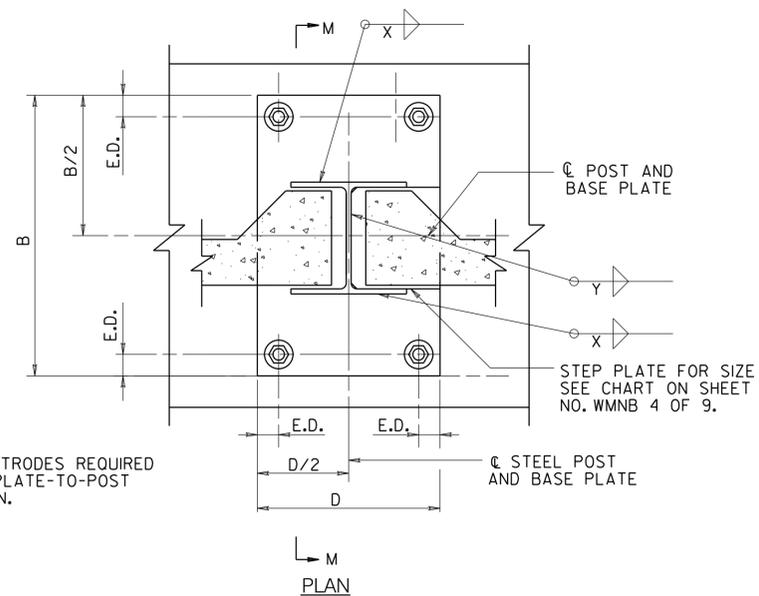
* THIS REGION OF PANEL SHALL BE FABRICATED WITHOUT TONGUE. THE AREA BETWEEN THE STACKED PANEL JOINTS SHALL HAVE A 3/4" X 3/4" ELASTOMERIC PAD ATTACHED TO THE PANEL WITH ADHESIVE.

* TYPE AND SIZE OF LIFTING DEVICES TO BE APPROVED BY THE ENGINEER.

THE FINISH SHALL BE IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIAL PROVISIONS (TYP.)

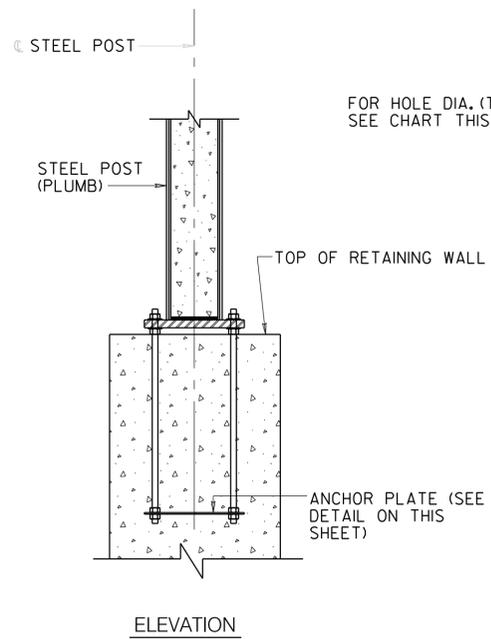
** LIFTING DEVICE AND PANEL

DETAIL NO.	NB-WM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
DATE:	DATE <MONTH, YEAR>	CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. WMNB-4 OF 9		SHEET NO. X OF X



NOTE:
E 70 ELECTRODES REQUIRED
AT BASE PLATE-TO-POST
CONNECTION.

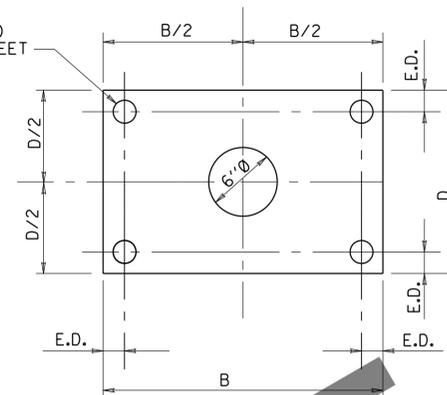
M
PLAN



POST /RETAINING WALL DETAIL

SCALE : 3/4" = 1'-0"

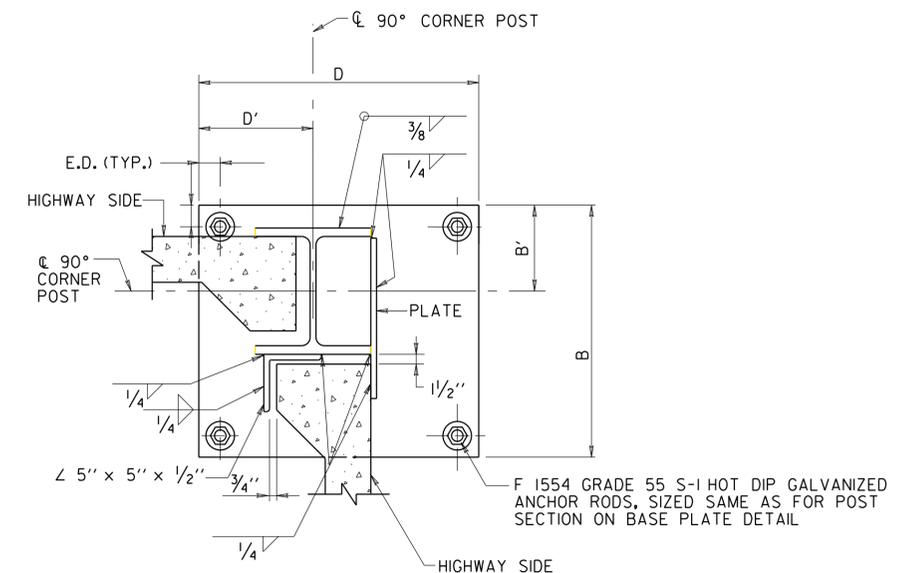
FOR HOLE DIA. (TYP.)
SEE CHART THIS SHEET



ANCHOR PLATE DETAIL

SCALE : 1/2" = 1'-0"

ANCHOR PLATE					
S	B	D	+A	DIAMETER HOLE	E.D.
12'	1'-5 1/2"	11"	1/4"	1 7/8"	1 3/8"
16'	1'-11"	1'-3"	1/4"	1 7/8"	1 3/8"
20'	1'-10"	1'-2"	1/4"	2 3/8"	2"

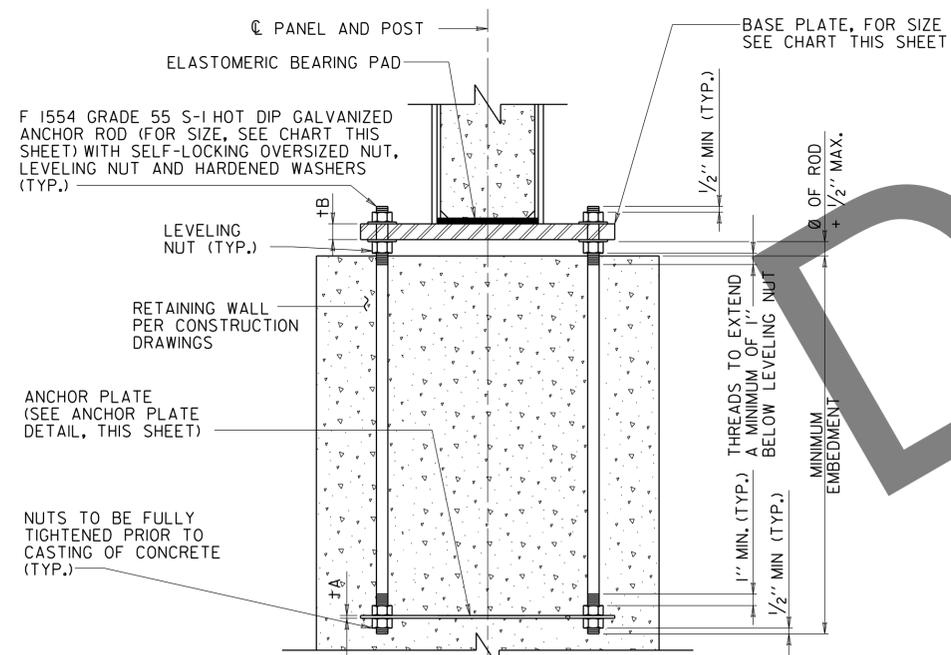


NOTES:
PROVIDE POST CAPS (1/4" PL) FOR 90° CORNER
POSTS SIMILAR TO END POST DETAIL.

CORNERS OTHER THAN 90° SHALL BE DETAILED
BY THE CONTRACTOR IN THE SHOP DRAWINGS.

90° CORNER DETAIL

SCALE : 1/2" = 1'-0"



SECTION M-M

BASE PLATE DETAIL

SCALE : 1/2" = 1'-0"

BASE PLATE										
S	BARRIER HEIGHT (H)	B	D	+B	ANCHOR ROD DIAMETER	DIAMETER HOLE	E.D.	X	Y	MINIMUM EMBEDMENT
12'	H ≤ 24'	1'-7 1/4"	1'-0 3/4"	2"	1 3/4"	1 7/8"	2 1/4"	7/16"	3/8"	2'-11"
	H ≤ 16'			1 1/2"						
16'	16' < H ≤ 20'	2'-0 3/4"	1'-4 3/4"	2"	1 3/4"	1 7/8"	2 1/4"	9/16"	3/8"	2'-11"
	20' < H ≤ 24'			2 1/2"						
20'	H ≤ 16'			1 1/2"						
	16' < H ≤ 20'	2'-0"	1'-4"	2"	2 1/4"	2 3/8"	3"	11/16"	3/8"	3'-11"
	20' < H ≤ 24'			2 1/2"						

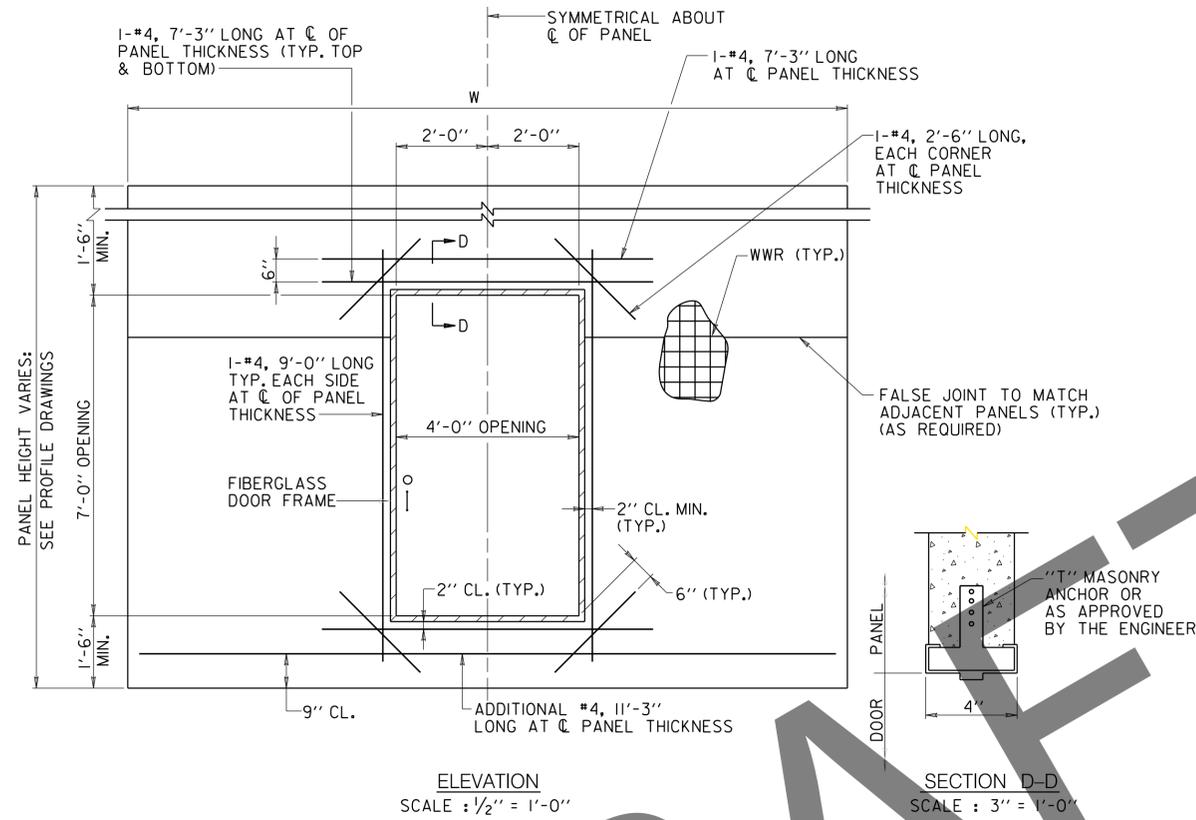
NOTES:
A 3/8" CONSTRUCTION TEMPLATE * WITH HOLES AND
OVERSIZED NUTS SHALL BE USED AS A TEMPORARY
CASTING TEMPLATE ON TOP OF THE RETAINING WALL
TO INSURE THE ANCHOR RODS ARE PROPERLY ALIGNED
AND PLUMB. THIS PLATE WILL THEN BE REMOVED TO
ALLOW PLACEMENT OF BASE PLATE. ALL NUTS SHALL
BE FULLY TIGHTENED PRIOR TO CASTING OF CONCRETE.

WHEN PLACING CONCRETE, CONTRACTOR SHALL USE
CARE NOT TO DROP CONCRETE ON ANCHOR PLATE.

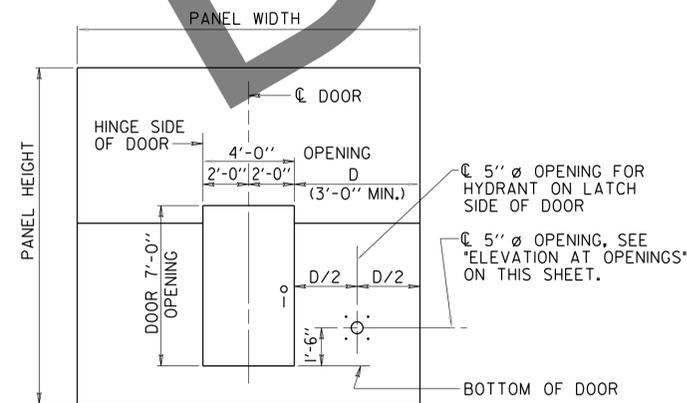
*ANCHOR ROD SPACING FOR 90° CORNER POSTS IS
DIFFERENT THAN TYPICAL POST.

90 DEGREE CORNER DETAIL						
S	CB	Y	CD	P	PLATE	E.D.
12'	1'-8 1/2"	10"	1'-6"	7 1/2"	14 1/2" x 1/2"	2 1/4"
16'	1'-8 1/2"	10"	1'-6 1/2"	7 1/2"	14 1/2" x 1/2"	2 1/4"
20'	2'-0 1/2"	1'-0 1/4"	2'-0"	10"	17" x 1/2"	3"

DETAIL NO.	NB-WM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
DATE:	VERSION	STEEL POST DETAILS
1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA	SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
	DRAWING NO. WMNB-5 OF 9	SHEET NO. X OF X



ACCESS DOOR DETAIL



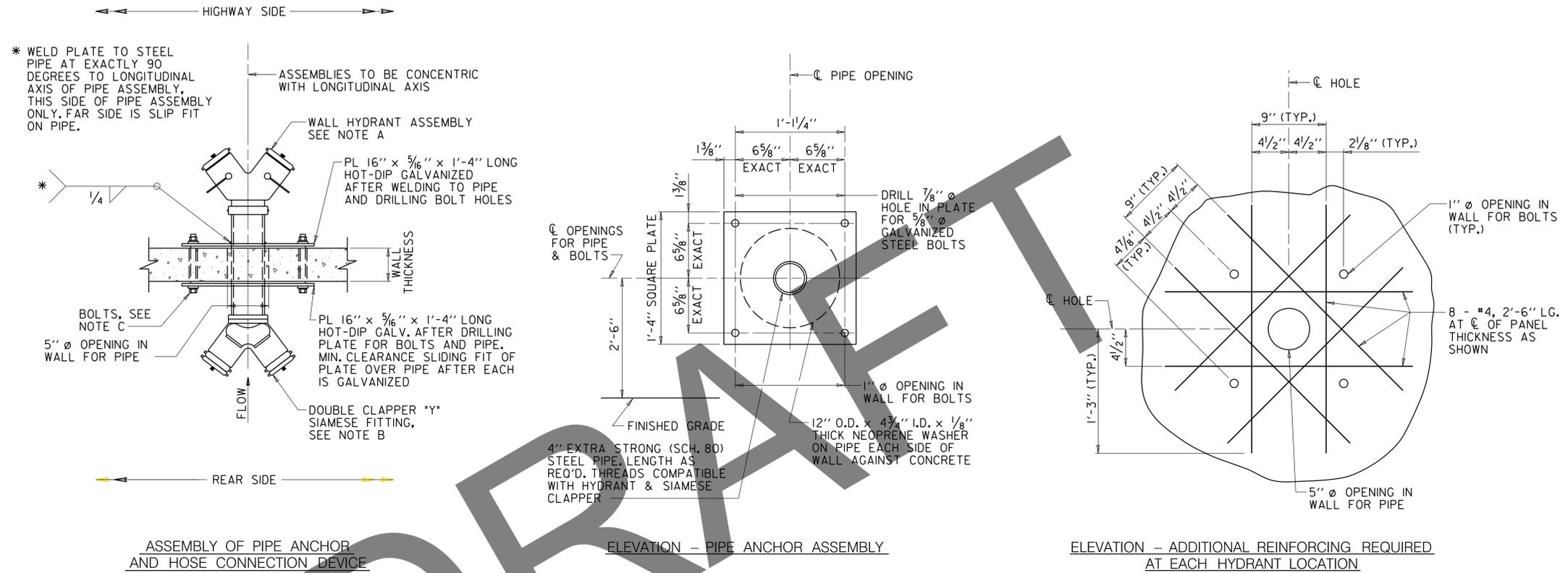
HYDRANT LOCATION IN WALL PANEL
SCALE : NONE

DOOR OPENINGS

- DOORS, IF REQUIRED, SHALL BE LOCATED AS SHOWN ON THE BARRIER LOCATION PLANS. THE LOWER EDGE OF THE DOOR SHALL BE LOCATED 1'-0" ABOVE THE FINISHED GRADE ON BOTH THE HIGHWAY SIDE AND THE REAR SIDE AT A GIVEN LOCATION.
- DOOR UNIT AND FRAME SHALL BE FIBERGLASS CONSTRUCTION SUITABLE FOR EXTERIOR DOOR APPLICATIONS WITH STAINLESS STEEL HARDWARE. DOORS SHALL BE MOUNTED ON TWO SETS OF HINGES. DOOR COLOR SHALL MATCH THE POST COLOR AND THE FINISH SHALL BE RESISTANT TO FADING FROM EXPOSURE TO ULTRAVIOLET LIGHT. DOORS NEED NOT BE FIRE RATED AND SHALL HAVE A POLYURETHANE FOAM OR MINERAL CORE.
- DOOR PULLS (2 NEEDED, ONE PER SIDE) SHALL BE THRU-BOLTED TO DOORS WITH SPANNER HEAD SCREWS, OR AS APPROVED BY THE ENGINEER. PROVIDE DOOR PULLS IN STAINLESS STEEL FINISH U.S. 32D. CENTER PULLS AT 3'-0" ABOVE FINISHED GRADE.
- DOORS SHALL HAVE TWO-SIDED TUBULAR LOCKING DEVICES WITH ALUMINUM OR STAINLESS STEEL FINISH. ALL LOCKS SHALL BE KEYED TO MATCH THE DOOR LOCKS IN NOISE BARRIERS FOR THE COUNTY IN WHICH THE PROJECT IS LOCATED.
- DOORS SHALL BE MOUNTED FLUSH WITH THE HIGHWAY SIDE OF THE NOISE BARRIER.

DRAFT

DETAIL NO.	NB-WM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
DATE:	DATE <MONTH, YEAR>	CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. WMNB-6 OF 9		SHEET NO. X OF X



* WELD PLATE TO STEEL PIPE AT EXACTLY 90 DEGREES TO LONGITUDINAL AXIS OF PIPE ASSEMBLY. THIS SIDE OF PIPE ASSEMBLY ONLY. FAR SIDE IS SLIP FIT ON PIPE.

* 1/4"

BOLTS, SEE NOTE C

FLOW

ASSEMBLIES TO BE CONCENTRIC WITH LONGITUDINAL AXIS

WALL HYDRANT ASSEMBLY SEE NOTE A

PL 16" x 5/16" x 1'-4" LONG HOT-DIP GALVANIZED AFTER WELDING TO PIPE AND DRILLING BOLT HOLES

WALL THICKNESS

PL 16" x 5/16" x 1'-4" LONG HOT-DIP GALV. AFTER DRILLING PLATE FOR BOLTS AND PIPE. MIN. CLEARANCE SLIDING FIT OF PLATE OVER PIPE AFTER EACH IS GALVANIZED

DOUBLE CLAPPER "Y" SIAMESE FITTING, SEE NOTE B

OPENINGS FOR PIPE & BOLTS

4" EXTRA STRONG (SCH. 80) STEEL PIPE, LENGTH AS REQ'D. THREADS COMPATIBLE WITH HYDRANT & SIAMESE CLAPPER

DRILL 7/8" Ø HOLE IN PLATE FOR 5/8" Ø GALVANIZED STEEL BOLTS

12" O.D. x 4 3/4" I.D. x 1/8" THICK NEOPRENE WASHER ON PIPE EACH SIDE OF WALL AGAINST CONCRETE

8 - #4, 2'-6" LG. AT Ø OF PANEL THICKNESS AS SHOWN

NOTES:

- A. WALL HYDRANT ASSEMBLY SHALL BE AKRON BRASS CO. NO. 1582, ELKHART BRASS MFG. CO., INC. NO. B-97 OR BADGER-POWHATAN BRASS AND IRON WORKS NO. 07-342 WALL HYDRANT WYE WITH BALL VALVE WITH ROCKERLUGS, TWO PLASTIC CAPS WITH CHAINS, PIPE FEMALE INLET AND TWO 2 1/2" THREADED MALE OUTLETS (NST). NO ESCUTCHEON PLATE. CAST BRASS FINISH.
- B. DOUBLE CLAPPER "Y" SIAMESE SHALL BE BADGER-POWHATAN BRASS AND IRON WORKS NO. 04-172, AKRON BRASS CO. NO. 1262 OR ELKHART BRASS MFG. CO., INC. NO. 12-X SIAMESE BODY WITH TWO BRASS PLUGS AND CHAINS. 4" PIPE FEMALE OUTLET AND TWO 2 1/2" THREADED FEMALE INLETS (NST). NO ESCUTCHEON PLATE. CAST BRASS FINISH.
- C. 5/8" Ø HOT-DIP GALVANIZED STEEL BOLT WITH 2-FLAT WASHERS, 1-LOCK WASH, HEX H. & N. ALL HOT-DIP GALVANIZED. CHASE THREADS IN NUT AFTER GALV. (TYP.) BOLT LENGTH AS REQUIRED.

STANDARD FIRE DEPARTMENT CONNECTION

SCALE : NONE

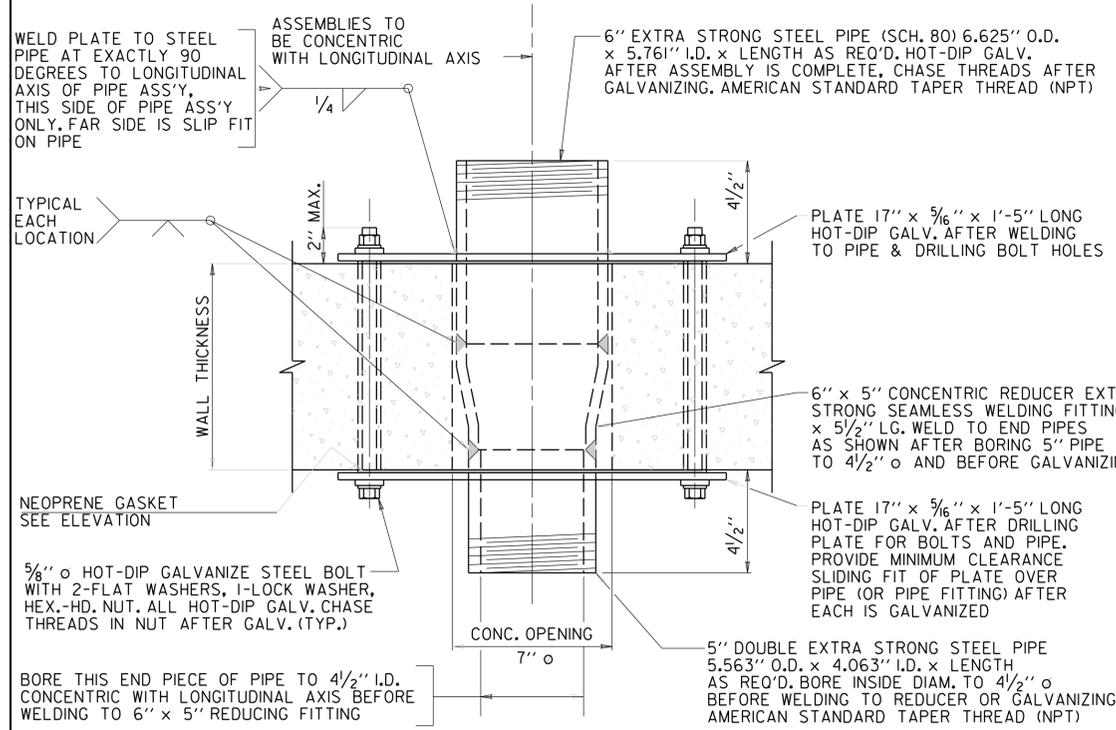
THIS SHEET NOT APPLICABLE FOR CONTRACTS IN ANNE ARUNDEL OR BALTIMORE COUNTIES.

DETAIL NO.	OFFICE OF STRUCTURES	
NB-WM-101	 MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION	
APPROVAL	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS	
DIRECTOR OFFICE OF STRUCTURES	HYDRANT CONNECTION DETAILS	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
1.0	DRAWN BY SHA	
	CHECKED BY SHA	
	DRAWING NO. WMNB-7 OF 9	SHEET NO. X OF X

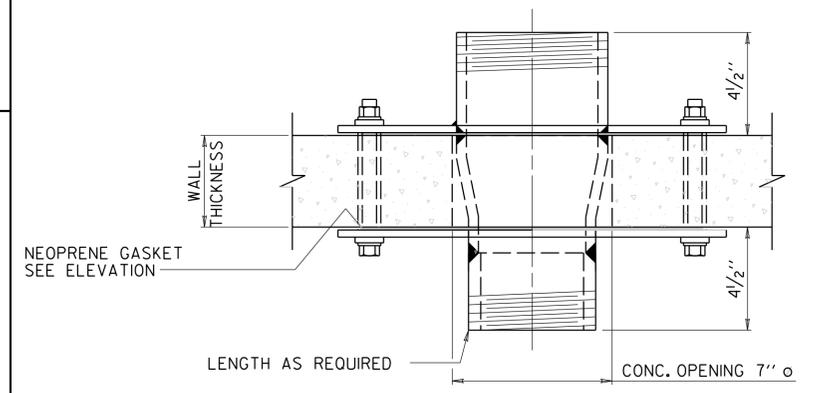
STRUCTURE INVENTORY NO. X

SURVEY BOOK NO. X

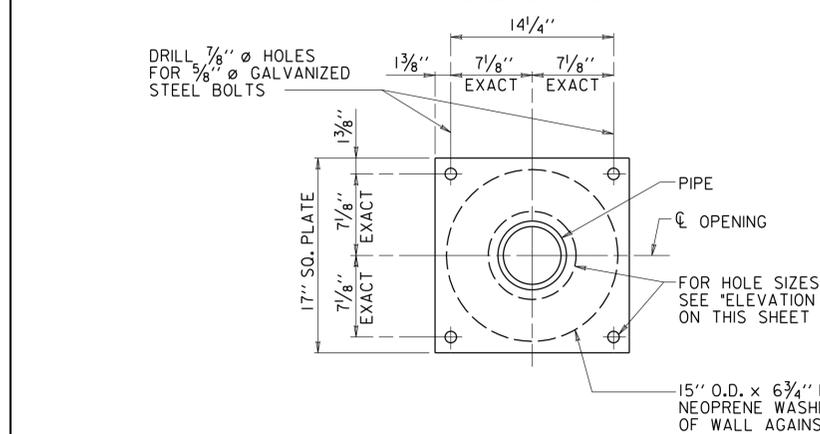
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 BY: 14kash



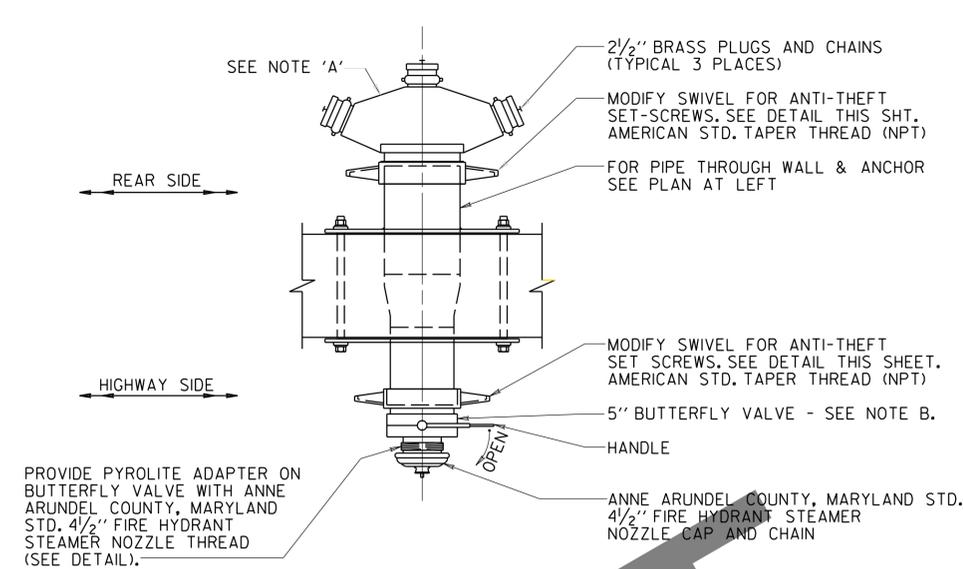
PLAN - PIPE ANCHOR THROUGH WALL
SCALE : 3" = 1'-0"



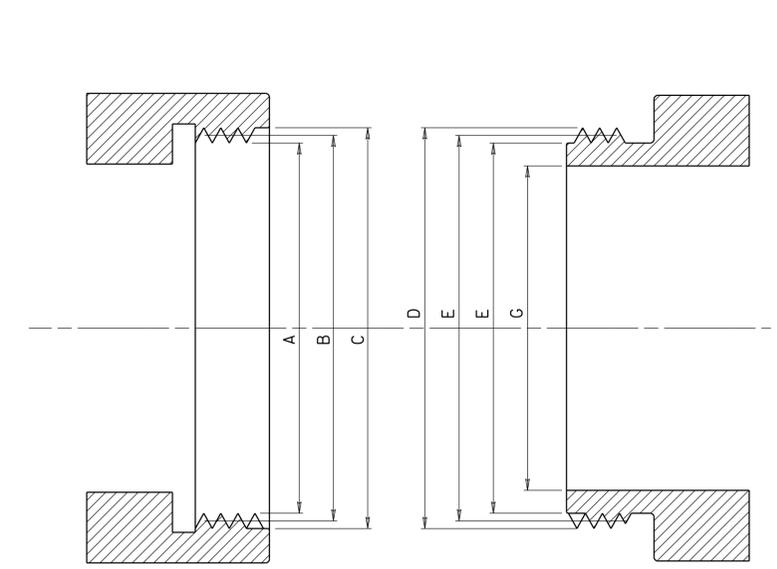
PLAN - PIPE ANCHOR THROUGH WALL
SCALE : 3" = 1'-0"



ELEVATION - PIPE ANCHOR ASSEMBLY
SCALE : 1 1/2" = 1'-0"



PLAN AT HYDRANT
SCALE : 1 1/2" = 1'-0"

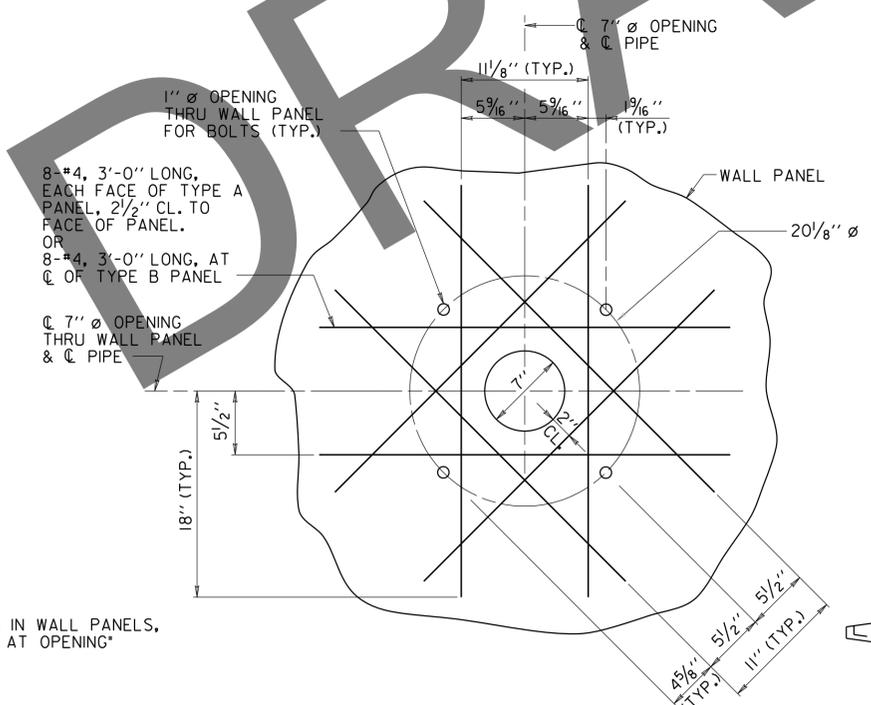


THREAD FORM 'V'						
FEMALE			MALE			
A	B	C	D	E	E	G
MINOR DIA.	PITCH DIA.	MAJOR DIA.	MAJOR DIA.	PITCH DIA.	MINOR DIA.	COUPLING I.D.
5.113	5.325	5.546	5.477 x	5.260	5.044	4 1/2"
5.103 x	5.320	5.536	5.467	5.255	5.034	

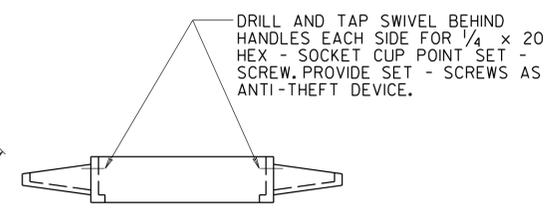
ANNE ARUNDEL COUNTY
4 1/2" THREAD DETAIL
SCALE : NONE

GENERAL NOTES

- MATERIALS AND SPECIFICATIONS:**
- | | | |
|---------------|-------|---|
| STEEL PLATE | A 709 | GRADE 36 |
| BOLTS | A 307 | GRADE A |
| PIPE | A 53 | SEAMLESS, GR. B |
| PIPE FITTINGS | A 234 | WROUGHT CARBON STEEL, SEAMLESS |
| GALVANIZING | A 123 | HOT-DIP GALV. FOR STEEL, ETC. |
| | A 153 | HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC. |
- WELDING AMERICAN WELDING SOCIETY AWS D1.1
- WORKING DRAWINGS:**
- WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

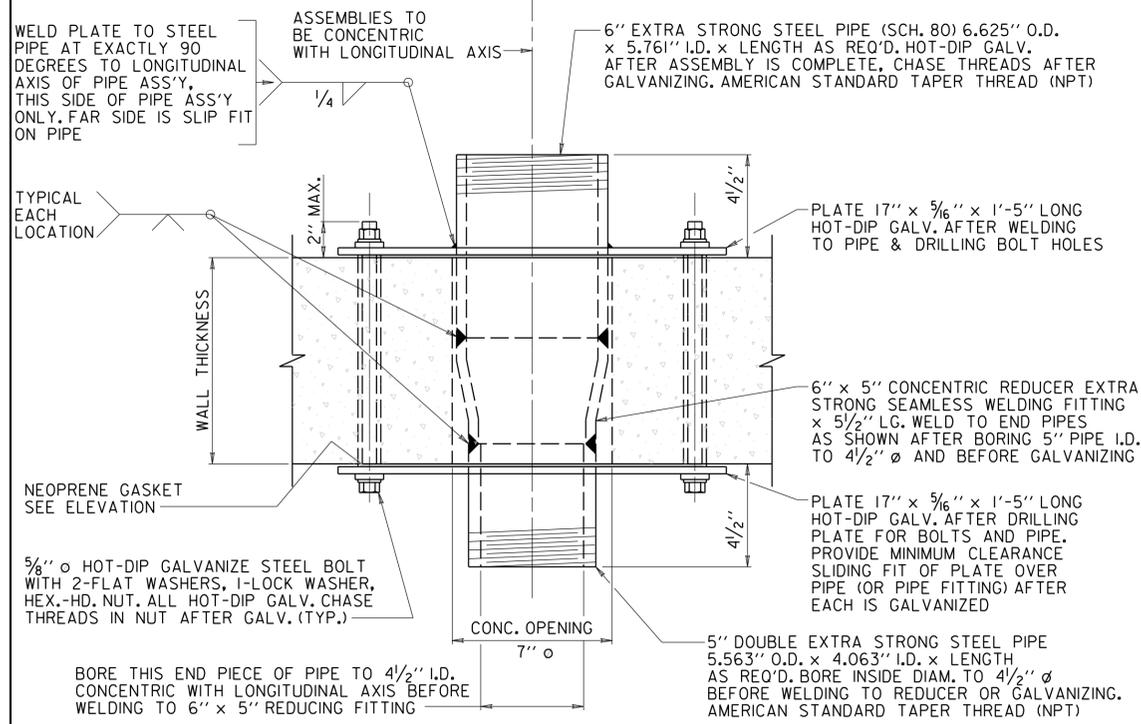


ELEVATION AT OPENINGS
SCALE : 1 1/2" = 1'-0"



SWIVEL ANTI-THEFT DEVICE
SCALE : NONE

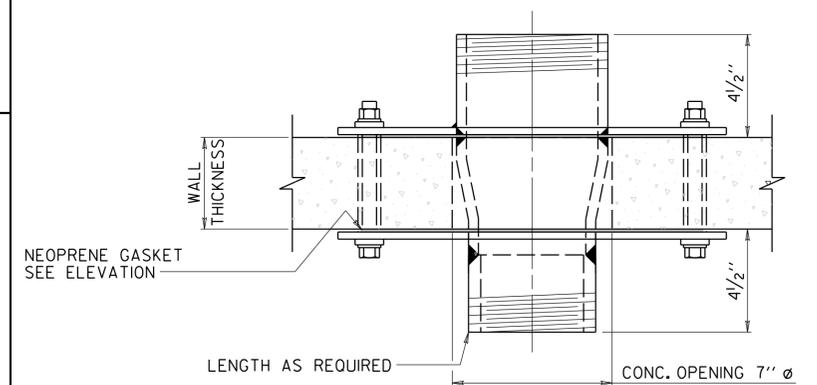
DETAIL NO.	NB-WM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' MAXIMUM HEIGHT
DATE:	DATE <MONTH, YEAR>	CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. WMNB-8 OF 9		SHEET NO. X OF X



(TYPE A - WALLS 8' OR MORE IN THICKNESS)

PLAN - PIPE ANCHOR THROUGH WALL

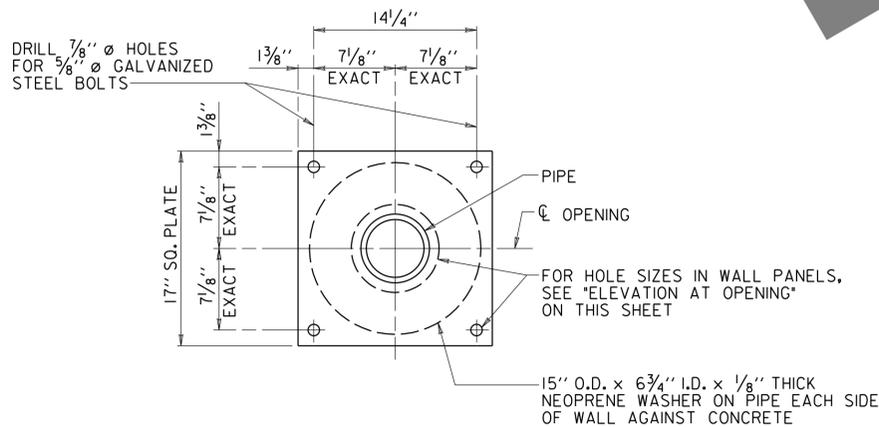
SCALE : 3" = 1'-0"



(TYPE B - WALLS 4' TO LESS THAN 8' IN THICKNESS)

PLAN - PIPE ANCHOR THROUGH WALL

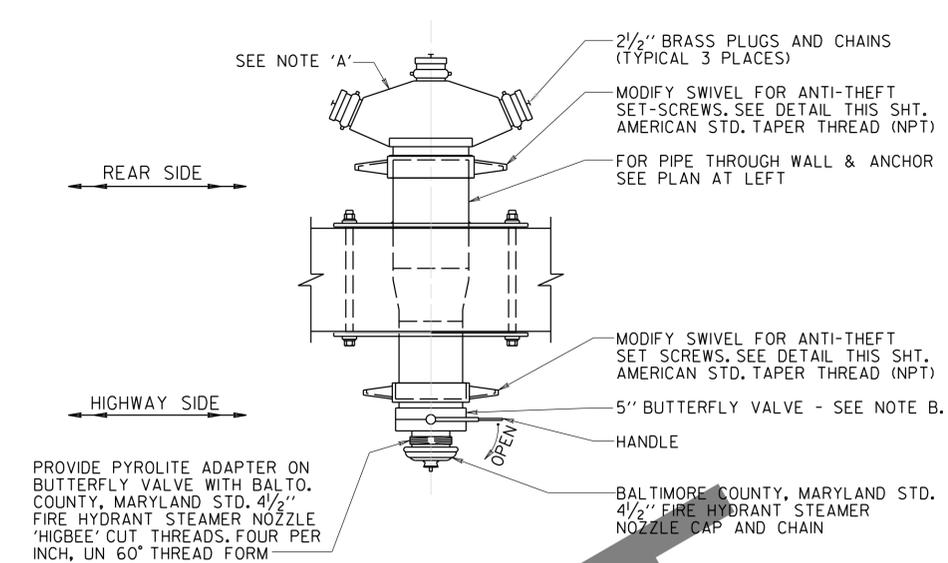
SCALE : 3" = 1'-0"



HIGHWAY SIDE SHOWN

ELEVATION - PIPE ANCHOR ASSEMBLY

SCALE : 1/2" = 1'-0"



NOTE 'A'

3 - WAY CLAPPER SIAMESE WITH THREE 2 1/2" FEMALE BY ONE 6" FEMALE - PYROLITE WITH PLUGS AND CHAINS AS NOTED, AND DRAIN VALVE. UNIT SHALL BE LIKE AKRON BRASS CO. NO. 2256, BADGER-POWATAN BRASS AND IRON WORKS NO. 04-168 OR J.W. MOON, INC. NO. 1372.

NOTE 'B'

BUTTERFLY VALVE WITH QUARTER - TURN HANDLE, FREE - FLOATING SELF - CENTERING DISC, MOLDED RUBBER SEAT - 5" VALVE SIZE. UNIT SHALL BE LIKE AKRON BRASS CO. NO. 7960, J.W. MOON, INC. NO. 760 VHK, OR ELKHART BRASS MFG. CO., INC. NO. 84 (WITH EXTENSIONS). CAP AS NOTED BELOW. PYROLITE MALE ADAPTER WITH "BALTIMORE" FORM OF THREAD ON OUTLET END OF VALVE ONLY.

PLAN AT HYDRANT

SCALE : 1/2" = 1'-0"



(FOR 3-WAY CLAPPER & BUTTERFLY VALVE)

SWIVEL ANTI - THEFT DEVICE

SCALE : NONE

GENERAL NOTES

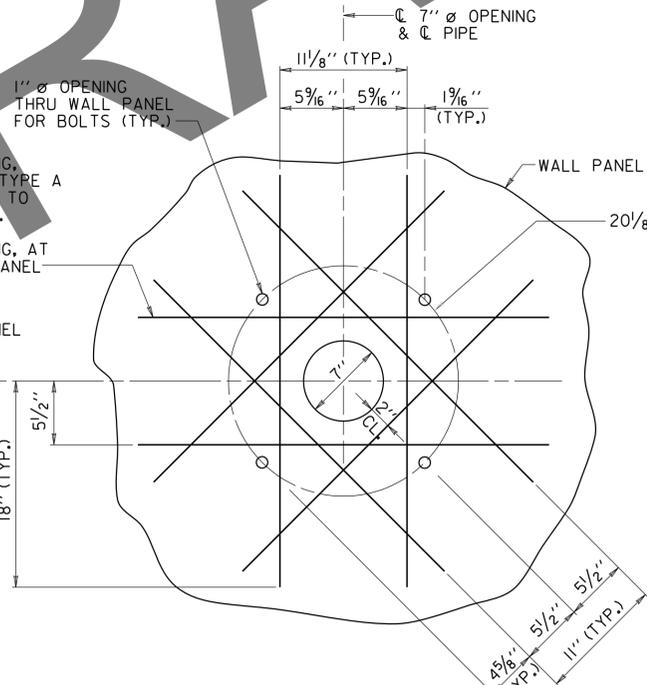
MATERIALS AND SPECIFICATIONS:

STEEL PLATE	A 709	GRADE 36
BOLTS	A 307	GRADE A
PIPE	A 53	SEAMLESS, GR. B
PIPE FITTINGS	A 234	WROUGHT CARBON STEEL, SEAMLESS
GALVANIZING	A 123	HOT-DIP GALV. FOR STEEL PLATE, ETC.
	A 153	HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC.
WELDING	AMERICAN WELDING SOCIETY AWS D1.1	

WORKING DRAWINGS:

WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

DRAFT



NOTE: OPENINGS THRU WALL PANELS MUST BE 90 DEGREES WITH THE PLANE OF THE PANELS.

ELEVATION AT OPENINGS

SCALE : 1/2" = 1'-0"

DETAIL NO.	OFFICE OF STRUCTURES	
NB-WM-101	RETAINING WALL MOUNTED NOISE BARRIER DETAILS	
APPROVAL	STEEL POSTS	
DIRECTOR OFFICE OF STRUCTURES	24' MAXIMUM HEIGHT	
DATE:	HYDRANT CONNECTION (BALTIMORE COUNTY)	
VERSION	SCALE VARIES	DATE <MONTH, YEAR>
1.0	DESIGNED BY SHA	CONTRACT NO. <CONTRACT NO.>
	DRAWN BY SHA	
	CHECKED BY SHA	
	DRAWING NO. WMNB-9 OF 9	SHEET NO. X OF X

Chapter 10 - Noise Barriers

SECTION 04

TALL WALL MOUNTED NOISE BARRIERS (NB-TWM)

GENERAL NOTES – TALL RETAINING WALL MOUNTED CONCRETE NOISE BARRIER

SPECIFICATIONS: MDOT SHA STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MATERIALS, DATED JULY 20XX.

DESIGN: AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 8TH EDITION.

LOADING: THE DESIGN WIND LOAD FOR THIS GROUND MOUNTED NOISE BARRIER SYSTEM IS 57 PSF APPLIED PERPENDICULAR TO THE BARRIER IN EACH DIRECTION.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED FOR A 20'-0" MAXIMUM RETAINING WALL HEIGHT.

THE NOISE BARRIER SYSTEM HAS BEEN DESIGNED FOR THE ADDITIONAL DEAD LOAD MOMENT CAUSED BY A TWO DEGREE (2°) ROTATION OF THE PANELS AND POSTS AT THE TOP OF THE RETAINING WALL.

CONCRETE: CONCRETE COMPRESSIVE STRENGTH FOR DESIGN SHALL BE:
 f'c = 3000 psi FOR ELEMENTS USING MIX NO. 3
 f'c = 3000 psi FOR ELEMENTS USING MIX NO. 4
 f'c = 4000 psi FOR ELEMENTS USING MIX NO. 6
 f'c = 5000 psi FOR PRECAST ELEMENTS USING MIX NO. 6

ALL CONCRETE FOR PRECAST CONCRETE ELEMENTS SHALL BE MIX NO. 6 (4500 PSI)

WHEN EXPOSED AGGREGATE IS SPECIFIED THE COARSE AGGREGATE SHALL BE AASHTO SIZE NO. 57 WASHED QUARTZ GRAVEL.

REINFORCING STEEL: REINFORCING STEEL SHALL CONFORM TO ASTM A 615 GRADE 60, WITH A YIELD STRENGTH FOR DESIGN OF fy = 60 000 psi.

WELDED WIRE REINFORCEMENT (WWR) SHALL CONFORM TO ASTM A 497 WITH A YIELD STRENGTH FOR DESIGN OF fy = 70 000 psi.

ALL SPLICES, NOT SHOWN, SHALL BE LAPPED AS PER BAR LAP CHARTS.

REINFORCING STEEL AND WELDED WIRE REINFORCEMENT THAT ARE WITHIN 10 FT OF THE OUTSIDE EDGE OF PAVED SHOULDER, MEASURED ALONG ANY TRAJECTORY SHALL BE EPOXY COATED.

ADDITIONAL REINFORCING WHICH MAY BE REQUIRED FOR HANDLING IS THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE SUBMITTED FOR APPROVAL WITH THE WORKING DRAWINGS.

STRUCTURAL STEEL: STRUCTURAL STEEL FOR SHAPES, POSTS, AND BASE PLATES SHALL CONFORM TO ASTM A 709 GRADE 50W.

STRUCTURAL STEEL FOR ANCHOR PLATES SHALL CONFORM TO ASTM A 36. ANCHOR RODS SHALL BE ASTM F 1554 GRADE 55 S-1, NUTS SHALL BE CARBON AND ALLOY STEEL ASTM A 563, WASHERS FOR THE TOP OF THE BASE PLATE SHALL BE HARDENED CLIPPED STEEL WASHERS ASTM F 436. ALL OTHER WASHERS SHALL BE HARDENED STEEL WASHERS ASTM F 436. ANCHOR PLATES, ANCHOR RODS, NUTS, AND WASHERS SHALL BE HOT DIPPED GALVANIZED IN CONFORMANCE WITH ASTM A 153.

ALL WELDS SHALL CONFORM TO ANSI/AWS D11.

PRECAST CONCRETE POSTS AND PANELS: FOR PANEL AND POST SURFACE TEXTURE, COLOR TREATMENT, ANTI-GRAFFITI COATING, OR NEED FOR EPOXY COATING, SEE THE SPECIAL PROVISIONS.

FALSE JOINTS SHALL BE PROVIDED FOR CONFORMITY IN THE HORIZONTAL ALIGNMENT OF PANEL JOINTS. THE CONTRACTOR SHALL SUBMIT WORKING DRAWINGS DETAILING THE PROPOSED FALSE JOINT AND OBTAIN WRITTEN APPROVAL PRIOR TO PRODUCTION OF A SAMPLE PANEL. THE CONTRACTOR SHALL PRODUCE A 4' X 4' SAMPLE PANEL WITH THE APPROVED FALSE JOINT AND APPROPRIATE ARCHITECTURAL FINISH FOR APPROVAL PRIOR TO USE.

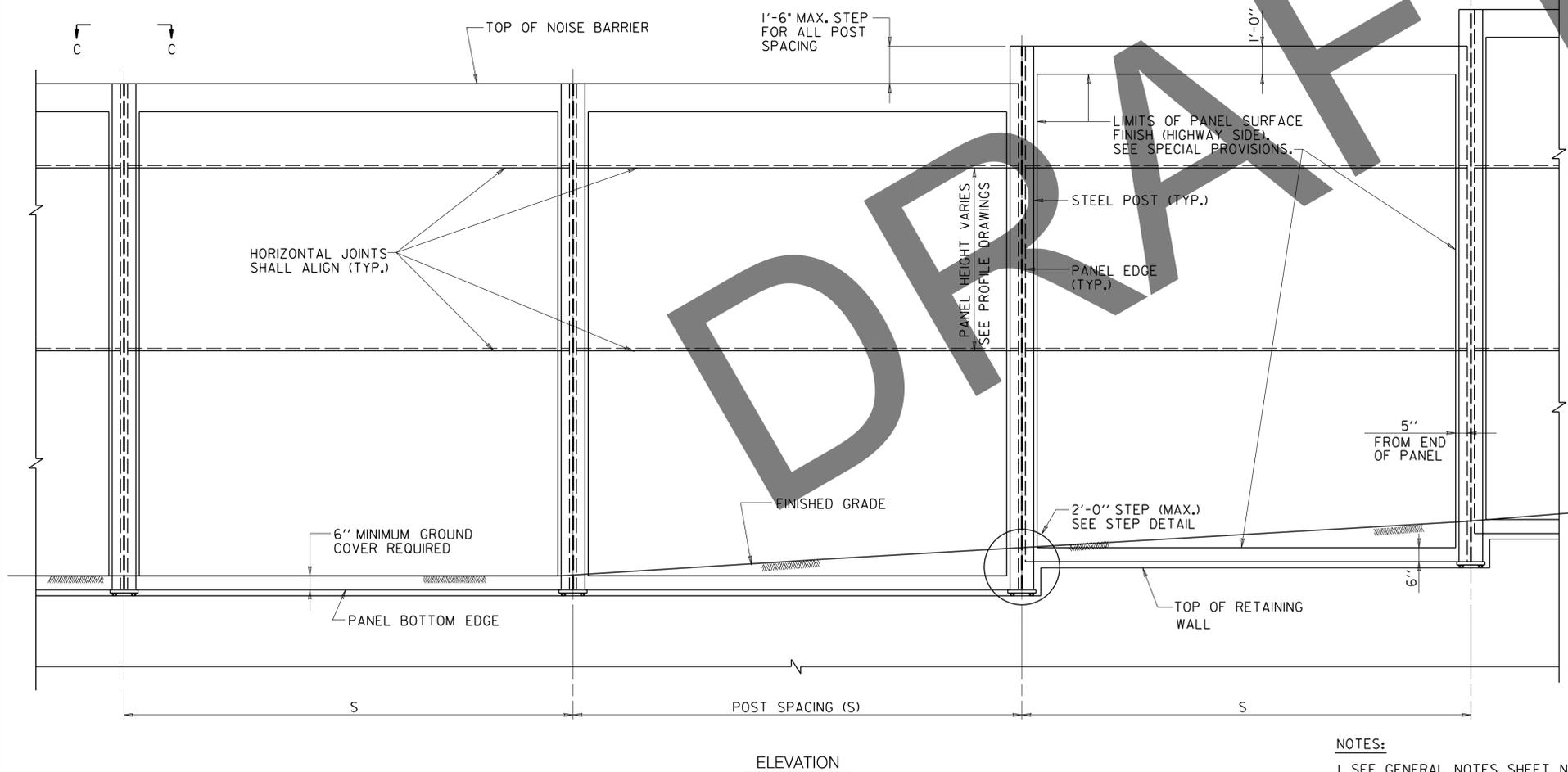
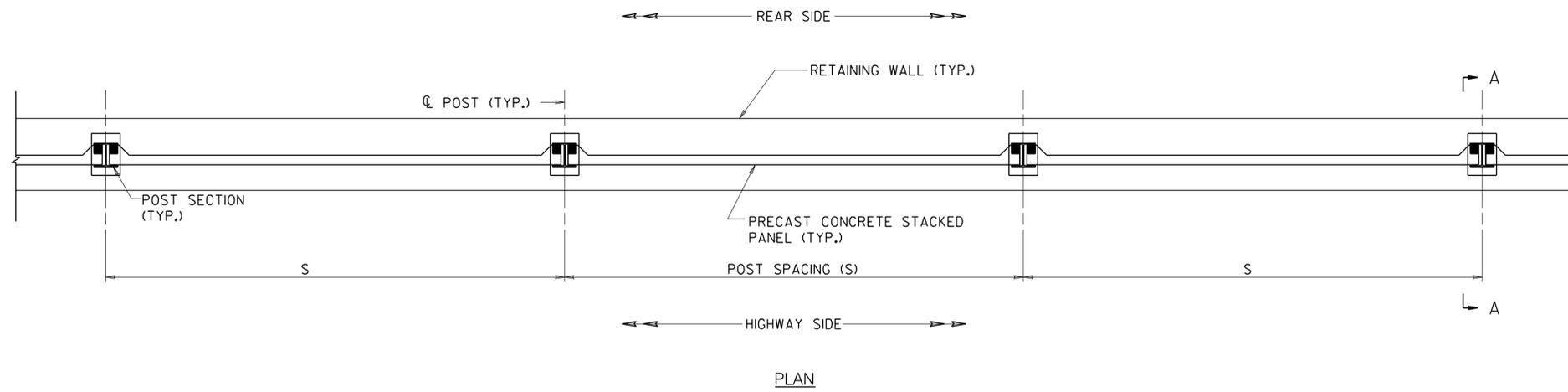
EXISTING STRUCTURES: ALL DIMENSIONS AFFECTED BY THE GEOMETRICS, AND/OR LOCATION OF THE EXISTING STRUCTURE SHALL BE CHECKED IN THE FIELD BY THE CONTRACTOR, BEFORE ANY CONSTRUCTION IS DONE, AND BEFORE ANY REINFORCING STEEL, ETC., IS ORDERED OR FABRICATED. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO SUPPLY THE ENGINEER WITH ALL FIELD DIMENSIONS REQUIRED TO CHECK DETAIL DRAWINGS. THE () MARKS INDICATE EXISTING DIMENSIONS AND STATIONS THAT MAY VARY AND DO REQUIRE FIELD VERIFICATION BY THE CONTRACTOR.

CONTRACT APPROVED OPTIONS: THE OPTIONS INDICATED BELOW WITH AN "X" ARE PERMITTED IN THIS CONTRACT.

POST SPACING:

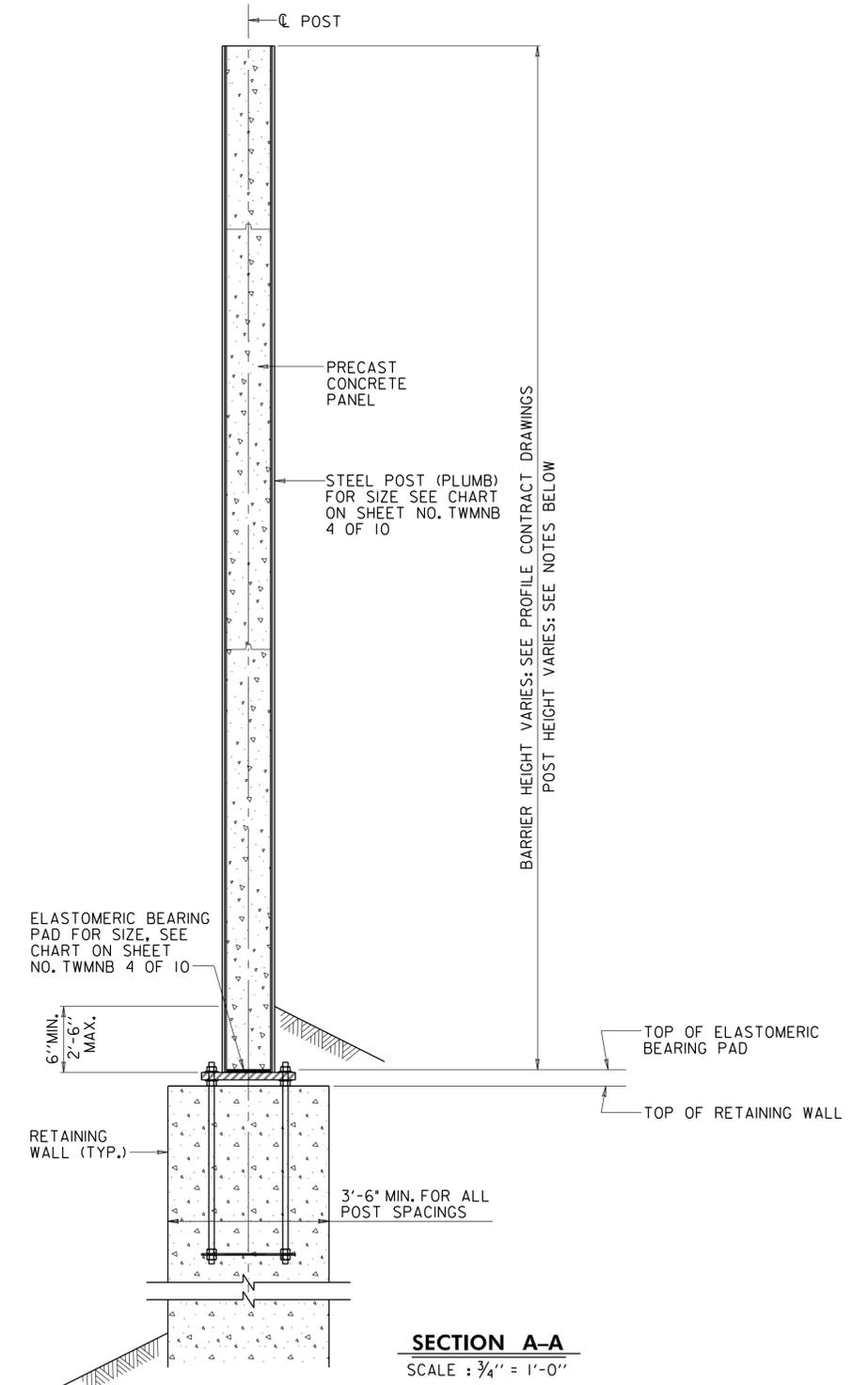
- 12'
- 16'
- 20'

DETAIL NO.	 MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION	OFFICE OF STRUCTURES RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'
NB-TWM-101		
APPROVAL		
_____ DIRECTOR OFFICE OF STRUCTURES	GENERAL NOTES	
DATE:	SCALE: VARIES	DATE: <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY: SHA	
	DRAWN BY: SHA	
	CHECKED BY: SHA	
1.0	DRAWING NO. NB-TWM-1 OF 10	SHEET NO. X OF X

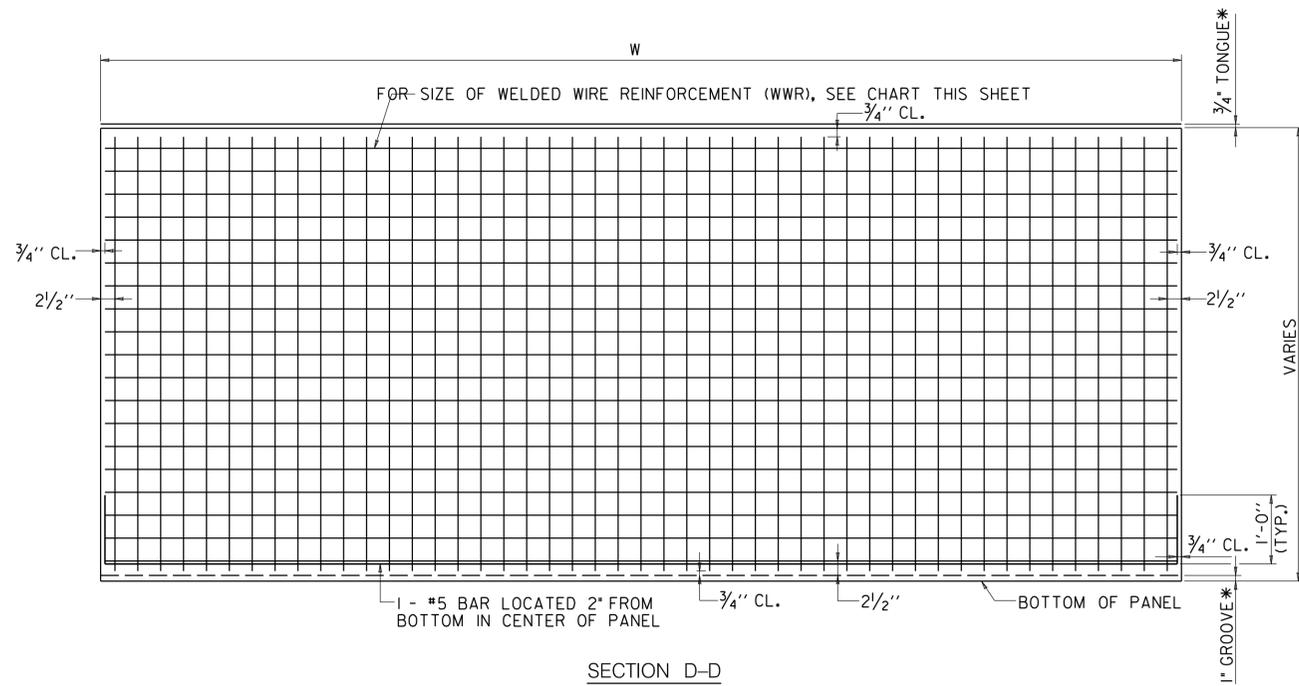


TALL PRECAST CONCRETE NOISE BARRIER ON FOUNDATIONS
SCALE : 3/8" = 1'-0"

- NOTES:
- SEE GENERAL NOTES SHEET NO. TWMNB 1 OF 10.
 - POSTS SHALL EXTEND TO THE TOP OF PANELS. IF TOP OF ADJACENT PANELS ARE AT DIFFERENT ELEVATIONS, THE POST SHALL EXTEND TO THE TOP OF THE HIGHER PANEL.
 - MINIMUM POST HEIGHT IS 24'-0", MAXIMUM POST HEIGHT IS 40'-0".
 - FOR VIEW C-C SEE SHEET NO. TWMNB 4 OF 10.



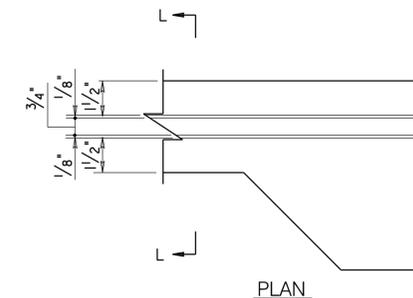
DETAIL NO.	NB-TWM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'
DATE:	VERSION	TYPICAL PLAN, ELEVATION, AND SECTION
1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA	SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
	DRAWING NO. NB-TWM-2 OF 10	SHEET NO. X OF X



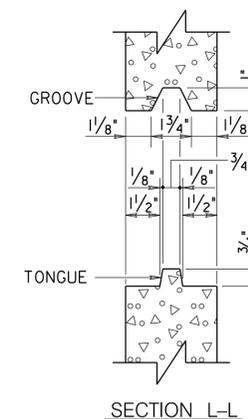
SECTION D-D

*DO NOT PROVIDE TONGUE AT TOP OF TOP PANEL OR GROOVE AT BOTTOM OF BOTTOM PANEL.

PANEL			
POST SPACING	W	L	WWR
12'	11'-9"	9'-1"	WWR 4 x 4- W6 x W6
16'	15'-9"	13'-1"	WWR 4 x 4- W8 x W8
20'	19'-9"	17'-1"	WWR 4 x 4- W12 x W12



PLAN

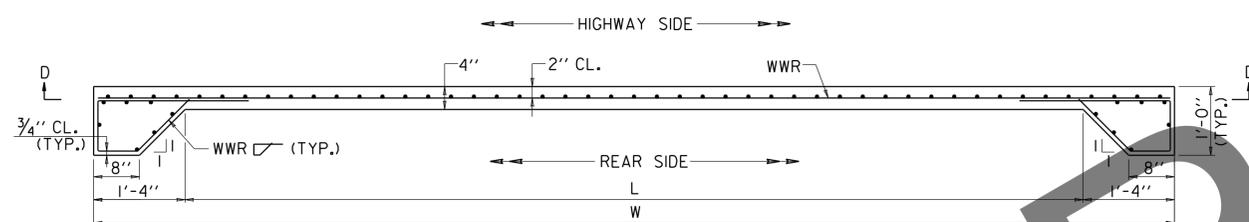


SECTION L-L

PANEL TONGUE AND GROOVE DETAILS

SCALE : 3" = 1'-0"

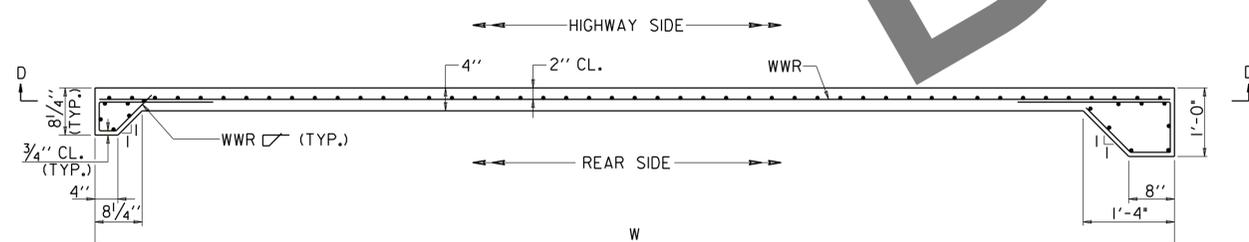
NOTE: DO NOT PROVIDE TONGUE AT TOP OF TOP PANEL OR GROOVE AT BOTTOM OF BOTTOM PANEL.



PLAN

STANDARD PANEL DETAILS

SCALE : 3/4" = 1'-0"



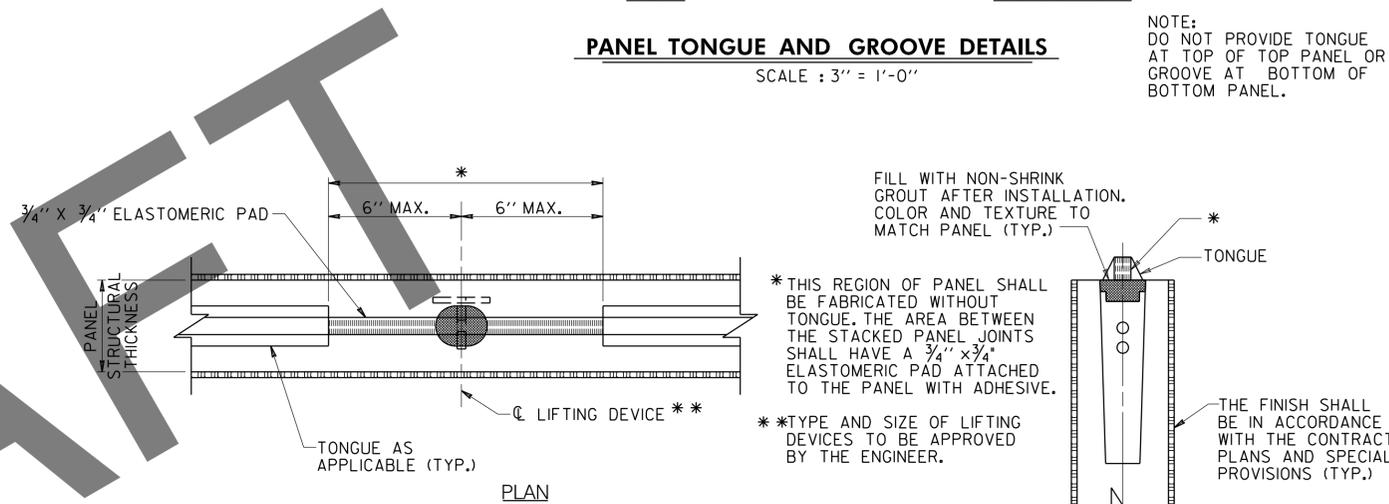
PLAN

TRANSITION PANEL (BETWEEN STANDARD & TALL WALLS)

SCALE : 3/4" = 1'-0"

NOTES:

1. REINFORCEMENT SHALL BE AS REQUIRED FOR THE TALL NOISE BARRIER PANEL.
2. THIS DETAIL IS FOR STEEL POSTS ONLY.



PLAN

LIFTING DEVICE SEAL DETAILS

SCALE: 3" = 1'-0"

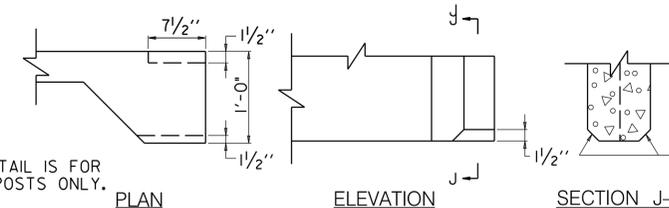
NOTE: USE THIS DETAIL FOR SEALING LIFTING DEVICES IN THE TOP OF THE TOP PANEL, NO ELASTOMERIC PAD REQUIRED.

* THIS REGION OF PANEL SHALL BE FABRICATED WITHOUT TONGUE. THE AREA BETWEEN THE STACKED PANEL JOINTS SHALL HAVE A 3/4" x 3/4" ELASTOMERIC PAD ATTACHED TO THE PANEL WITH ADHESIVE.

** TYPE AND SIZE OF LIFTING DEVICES TO BE APPROVED BY THE ENGINEER.

** C LIFTING DEVICE AND PANEL

THE FINISH SHALL BE IN ACCORDANCE WITH THE CONTRACT PLANS AND SPECIAL PROVISIONS (TYP.)



PLAN

ELEVATION

SECTION J-J

PANEL BOTTOM CORNER DETAIL

SCALE : 1" = 1'-0"

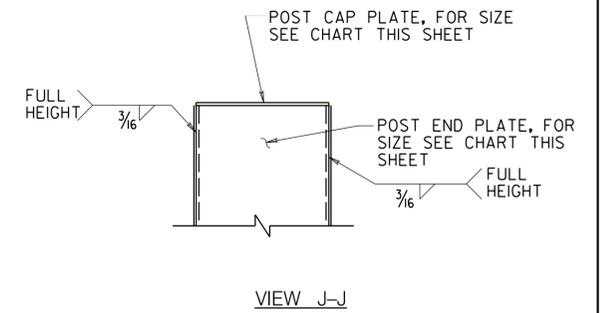
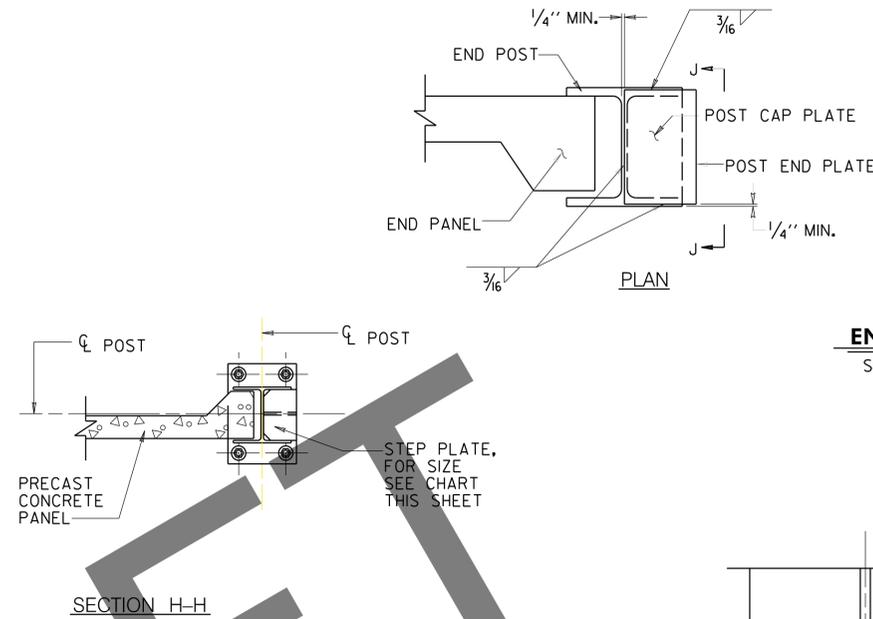
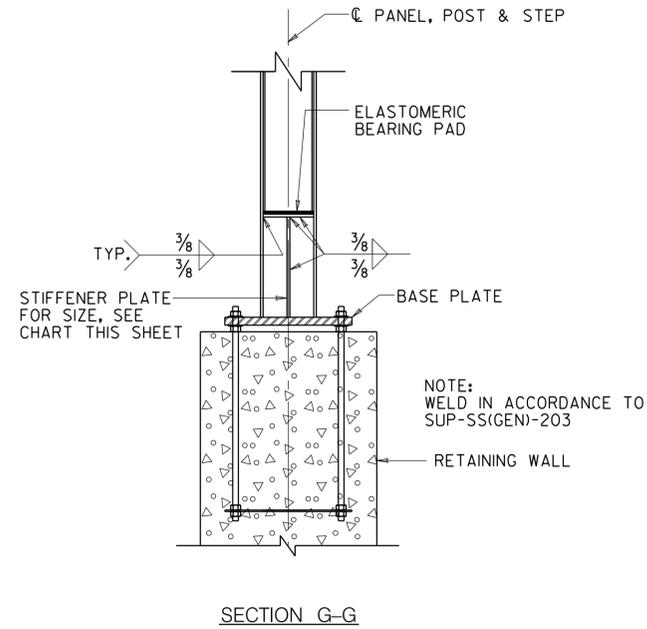
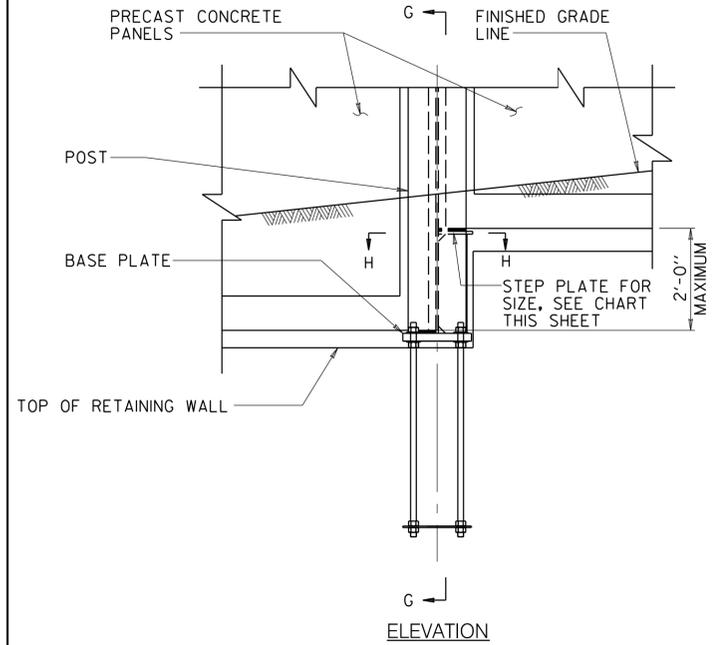
NOTE: THIS DETAIL IS FOR STEEL POSTS ONLY.

CHAMFER AT BASE OF PANEL IS REQUIRED TO CLEAR WELDS BETWEEN BASE PLATE AND INSIDE OF FLANGE.

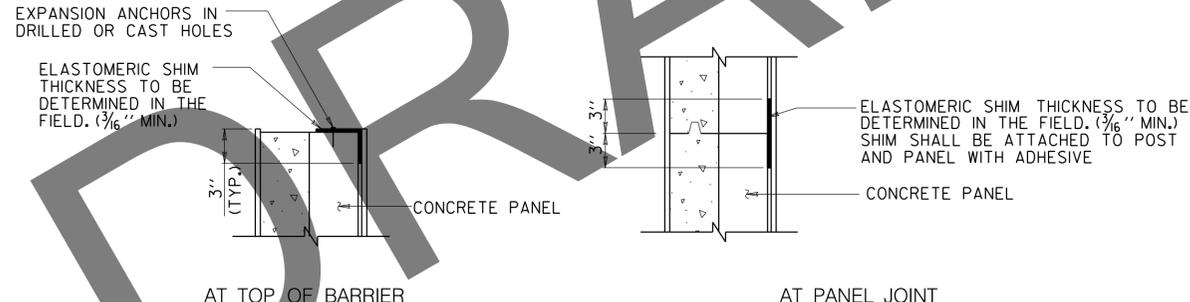
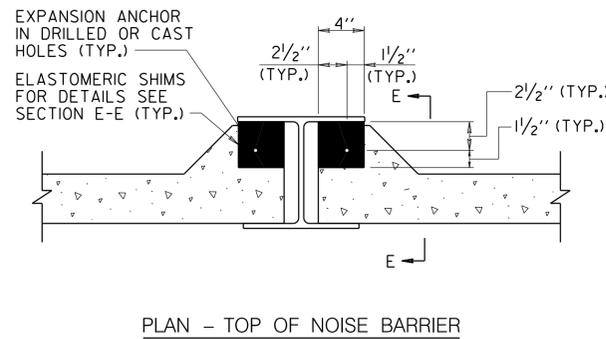
NOTES:

1. SEE GENERAL NOTES SHEET NO. TWMNB 1 OF 10.
2. COVER FOR REINFORCING IN PRECAST PANEL SHALL BE 3/4" EXCEPT AS NOTED.
3. WELDED WIRE REINFORCEMENT (WWR) IN FLANGES OF PANELS SHALL BE PLACED AS SHOWN.
4. PROVIDE 6" VERTICAL ELASTOMERIC SHIM ON REAR SIDE OF EACH PANEL AT PANEL JOINTS.
5. THE MAXIMUM ANGLE THAT A PANEL CAN BE PLACED WITHIN A STEEL POST IS 3°-00'-0".
6. THE MINIMUM HEIGHT OF ANY STACKED PANEL IS 4'-0". THE MAXIMUM HEIGHT OF A STACKED PANEL IS 12'-0".

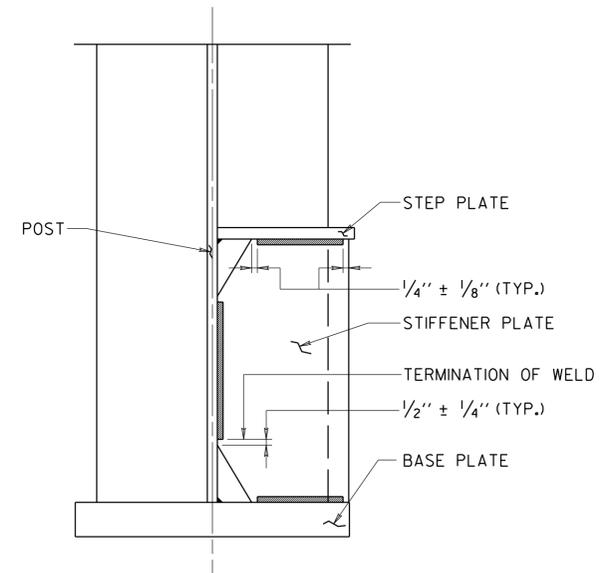
DETAIL NO.	NB-TWM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'
VERSION	1.0	PANEL DETAILS
DATE:		SCALE VARIES DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
DRAWING NO.	NB-TWM-3 OF 9	SHEET NO. X OF X



END POST DETAIL
SCALE : 1/2" = 1'-0"



ELASTOMERIC SHIM DETAILS
SCALE : 1/2" = 1'-0"



STIFFENER PLATE WELD TERMINATION DETAIL
SCALE : 3' = 1'-0"

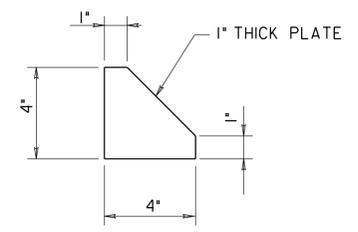
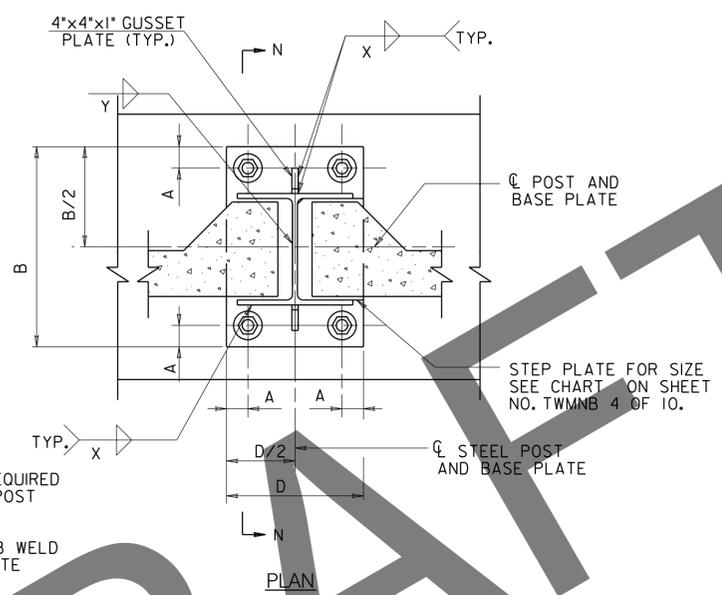
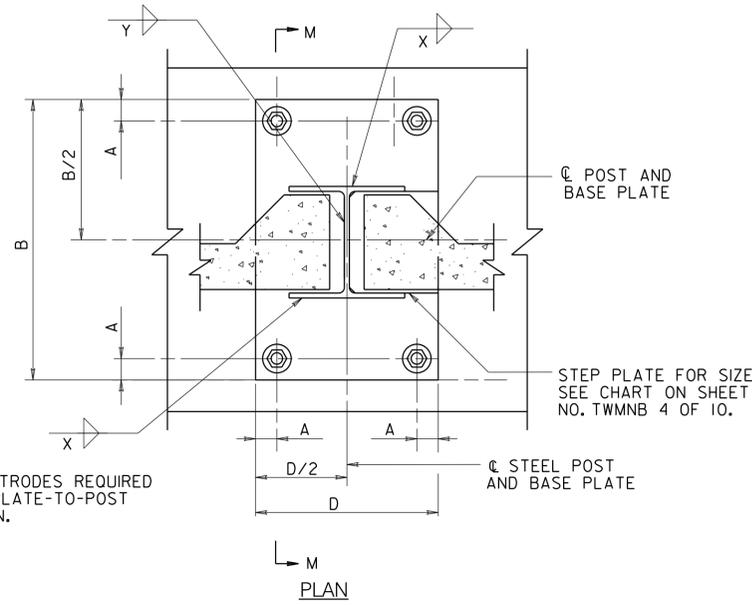
STEEL POST DETAILS								
POST SPACING	BARRIER HEIGHT (H)	POST LABEL	POST	STEP PLATE	STIFFENER PLATE	POST CAP PLATE	POST END PLATE	ELASTOMERIC BEARING PAD
12'	38' < H < 40'	W40	W14 X 109	3/4" X 12"	3/4" X 11 3/4"	1/4" X 7 9/16" X 13 9/16"	1/4" X 13 13/16" X H	1/2" X 12 1/2" X 11"
	34' < H < 38'	W38	W14 X 99	3/4" X 12"	3/4" X 11 3/4"	1/4" X 7 1/2" X 13 11/16"	1/4" X 13 11/16" X H	1/2" X 11 3/4" X 11"
	30' < H < 34'	W34	W14 X 90	3/4" X 10 3/4"	3/4" X 10 1/2"	1/4" X 7 1/2" X 13 1/2"	1/4" X 13 1/2" X H	1/2" X 10 1/2" X 11"
	24' < H < 30'	W30	W14 X 68	3/4" X 8 1/4"	3/4" X 8"	1/4" X 5 1/4" X 13 1/2"	1/4" X 13 1/2" X H	1/2" X 8" X 11"
16'	38' < H < 40'	W40	W14 X 145	3/4" X 12 1/2"	3/4" X 12 1/4"	1/4" X 7 11/16" X 14 3/16"	1/4" X 14 3/16" X H	1/2" X 12 1/4" X 11"
	34' < H < 38'	W38	W14 X 132	3/4" X 12 1/4"	3/4" X 12"	1/4" X 7 5/8" X 14"	1/4" X 14" X H	1/2" X 12" X 11"
	30' < H < 34'	W34	W14 X 99	3/4" X 12"	3/4" X 11 3/4"	1/4" X 7 1/2" X 13 11/16"	1/4" X 13 11/16" X H	1/2" X 11 3/4" X 11"
	24' < H < 30'	W30	W14 X 90	3/4" X 12"	3/4" X 11 3/4"	1/4" X 7 1/2" X 13 1/2"	1/4" X 13 1/2" X H	1/2" X 11 3/4" X 11"
20'	38' < H < 40'	W40	W14 X 176	3/4" X 12 1/2"	3/4" X 12 1/4"	1/4" X 7 11/16" X 14 3/16"	1/4" X 14 3/16" X H	1/2" X 12 1/4" X 11"
	34' < H < 38'	W38	W14 X 159	3/4" X 12 1/2"	3/4" X 12 1/4"	1/4" X 7 11/16" X 14 3/16"	1/4" X 14 3/16" X H	1/2" X 12 1/4" X 11"
	30' < H < 34'	W34	W14 X 132	3/4" X 12 1/4"	3/4" X 12"	1/4" X 7 5/8" X 14"	1/4" X 14" X H	1/2" X 12" X 11"
	24' < H < 30'	W30	W14 X 99	3/4" X 12"	3/4" X 11 3/4"	1/4" X 7 1/2" X 13 11/16"	1/4" X 13 11/16" X H	1/2" X 11 3/4" X 11"

NOTE:
THE POST LABEL SHALL BE PAINTED ON THE FLANGE AT THE BOTTOM OF EACH POST WITH MINIMUM LETTER HEIGHT OF 3".

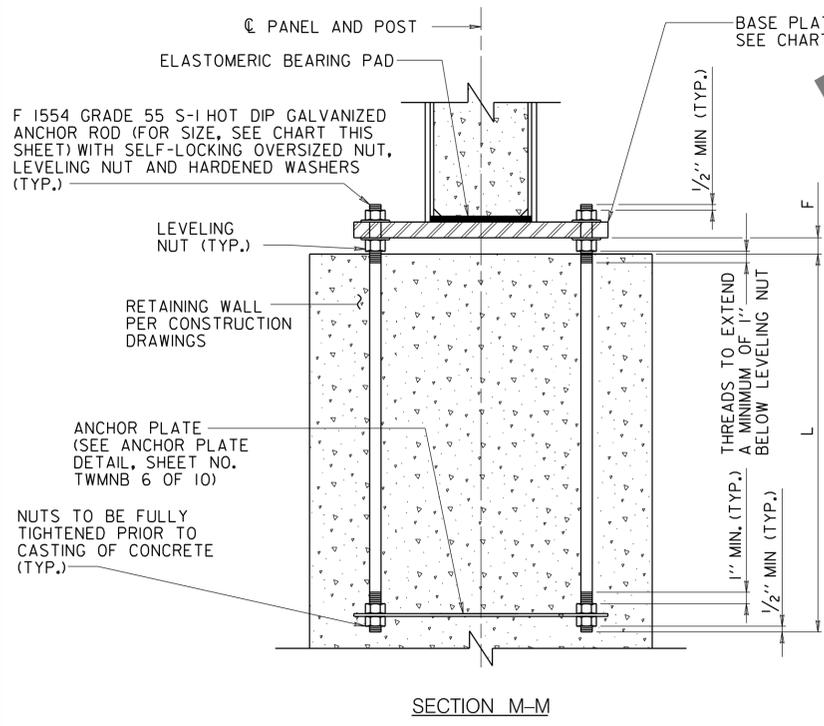
DETAIL NO.	OFFICE OF STRUCTURES	
NB-TWM-101	RETAINING WALL MOUNTED NOISE BARRIER DETAILS	
APPROVAL	STEEL POSTS	
DIRECTOR OFFICE OF STRUCTURES	24' < H <= 40'	
PANEL AND POST DETAILS		
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
	DRAWN BY SHA	
	CHECKED BY SHA	
1.0	DRAWING NO. NB-TWM-4 OF 10	SHEET NO. X OF X

BASE PLATE													
POST SPACING	BARRIER HEIGHT (H)	B	D	THICKNESS	DIAMETER HOLE	A	ANCHOR ROD DIAMETER	F	L	STANDARD BASE PLATE		MODIFIED BASE PLATE	
										X	Y	X	Y
12'	38' <H≤40'	2'-6 1/2"	1'-10 3/4"	2 3/4"	2 9/16"	4"	2 1/4"	3"	3'-9"	11/16"	3/8"	9/16"	5/16"
	34' <H≤38'	2'-6"	1'-10 1/2"	2 1/2"	2 9/16"	4"	2 1/4"	3"	3'-9"	5/8"	5/16"	1/2"	5/16"
	30' <H≤34'	2'-4"	1'-9 1/2"	2 1/4"	2 5/16"	3 1/2"	2"	3"	3'-4"	1/2"	5/16"	3/8"	5/16"
	24' <H≤30'	2'-3 1/2"	1'-4 1/2"	2"	2 1/16"	3 1/4"	1 3/4"	3"	2'-11"	9/16"	5/16"	3/8"	5/16"
16'	38' <H≤40'	2'-9"	2'-0 1/2"	3"	2 15/16"	4 1/2"	2 1/2"	3"	4'-2"	13/16"	7/16"	11/16"	3/8"
	34' <H≤38'	2'-8 3/4"	2'-1 3/4"	2 3/4"	2 13/16"	4 1/2"	2 1/2"	3"	4'-2"	3/4"	7/16"	5/8"	3/8"
	30' <H≤34'	2'-6 1/2"	2'-0"	2 1/2"	2 9/16"	4"	2 1/4"	3"	3'-9"	5/8"	5/16"	1/2"	5/16"
	24' <H≤30'	2'-4 1/2"	1'-5 1/2"	2 1/4"	2 5/16"	3 1/2"	2"	3"	3'-4"	11/16"	5/16"	7/16"	5/16"
20'	38' <H≤40'	2'-11 1/4"	2'-0 3/4"	3 1/4"	3 1/16"	5"	2 3/4"	3 1/4"	4'-7"	1"	9/16"	13/16"	1/2"
	34' <H≤38'	2'-11"	2'-1"	3"	3 1/16"	5"	2 3/4"	3 1/4"	4'-7"	7/8"	1/2"	3/4"	3/8"
	30' <H≤34'	2'-8 3/4"	1'-11 3/4"	2 3/4"	2 13/16"	4 1/2"	2 1/2"	3"	4'-2"	3/4"	7/16"	5/8"	3/8"
	24' <H≤30'	2'-6 1/4"	1'-10 3/4"	2 1/2"	2 9/16"	4"	2 1/4"	3"	3'-9"	5/8"	5/16"	1/2"	5/16"

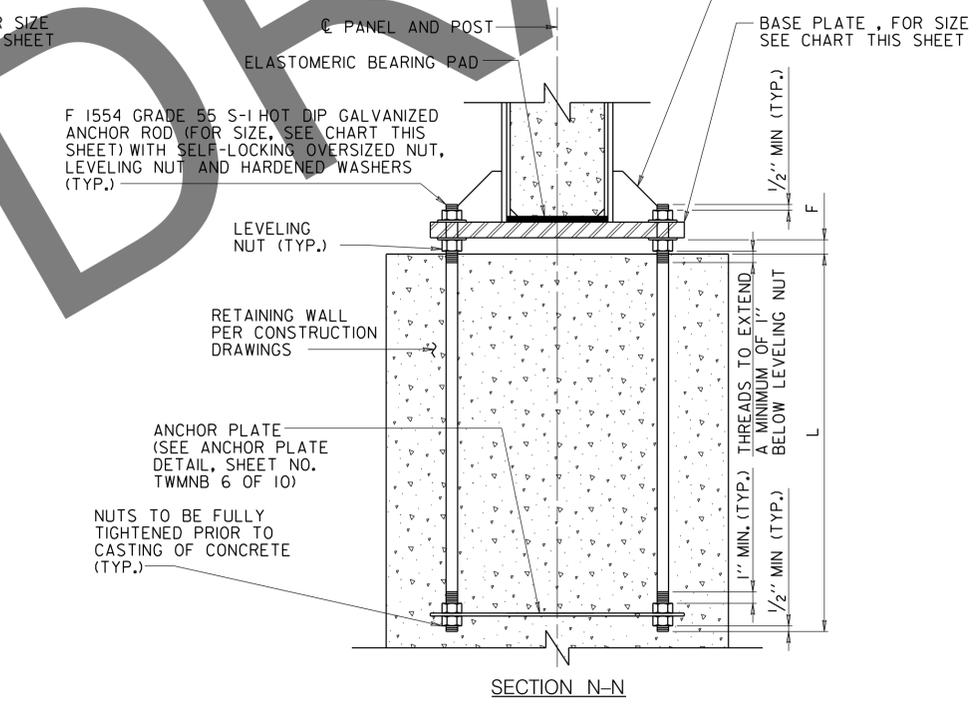
NOTE:
THE STANDARD BASE PLATE DETAIL IS APPLICABLE TO ALL STEEL POSTS.
THE MODIFIED BASE PLATE DETAIL IS AN ACCEPTABLE ALTERNATIVE AT NO ADDITIONAL COST.



GUSSET PLATE DETAIL
SCALE : 3" = 1'-0"



BASE PLATE DETAIL
SCALE : 1 1/2" = 1'-0"



MODIFIED BASE PLATE DETAIL
SCALE : 1 1/2" = 1'-0"

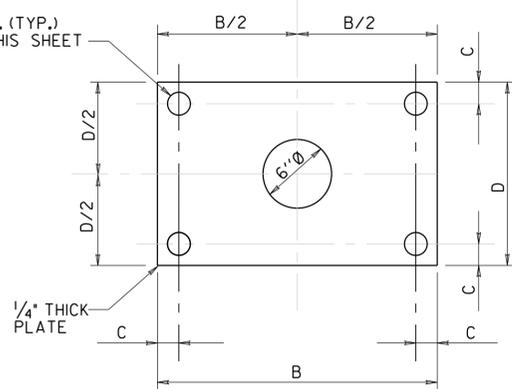
NOTES:
A 3/8" CONSTRUCTION TEMPLATE *WITH HOLES AND OVERSIZED NUTS SHALL BE USED AS A TEMPORARY CASTING TEMPLATE ON TOP OF THE RETAINING WALL TO INSURE THE ANCHOR RODS ARE PROPERLY ALIGNED AND PLUMB. THIS PLATE WILL THEN BE REMOVED TO ALLOW PLACEMENT OF BASE PLATE. ALL NUTS SHALL BE FULLY TIGHTENED PRIOR TO CASTING OF CONCRETE.

WHEN PLACING CONCRETE, CONTRACTOR SHALL USE CARE NOT TO DROP CONCRETE ON ANCHOR PLATE.

*ANCHOR ROD SPACING FOR 90° CORNER POSTS IS DIFFERENT THAN TYPICAL POST.

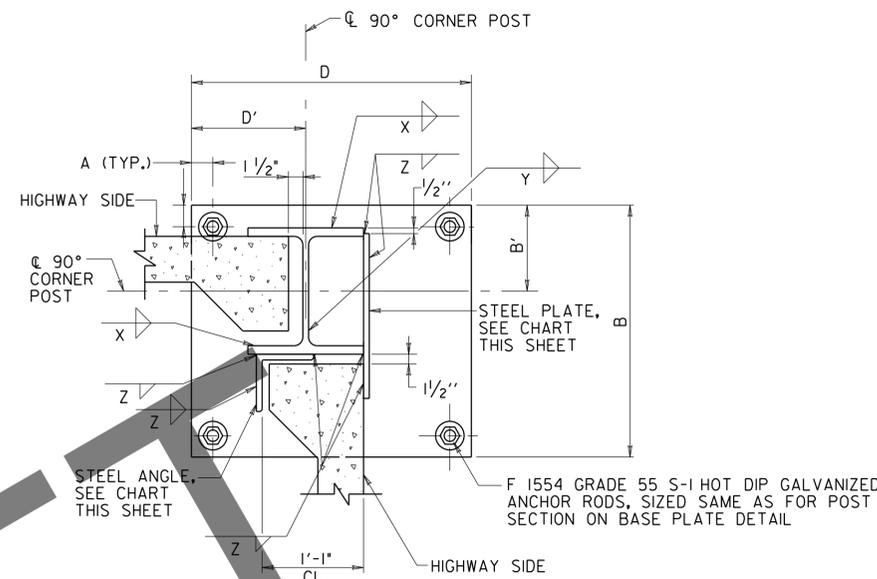
DETAIL NO.	NB-TWM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. NB-TWM-5 OF 10		SHEET NO. X OF X

FOR HOLE DIA. (TYP.)
SEE CHART THIS SHEET



ANCHOR PLATE DETAIL

SCALE : 1/2" = 1'-0"



NOTES:
PROVIDE POST CAPS (1/4" PL) FOR 90° CORNER POSTS SIMILAR TO END POST DETAIL.

CORNERS OTHER THAN 90° SHALL BE DETAILED BY THE CONTRACTOR IN THE SHOP DRAWINGS.

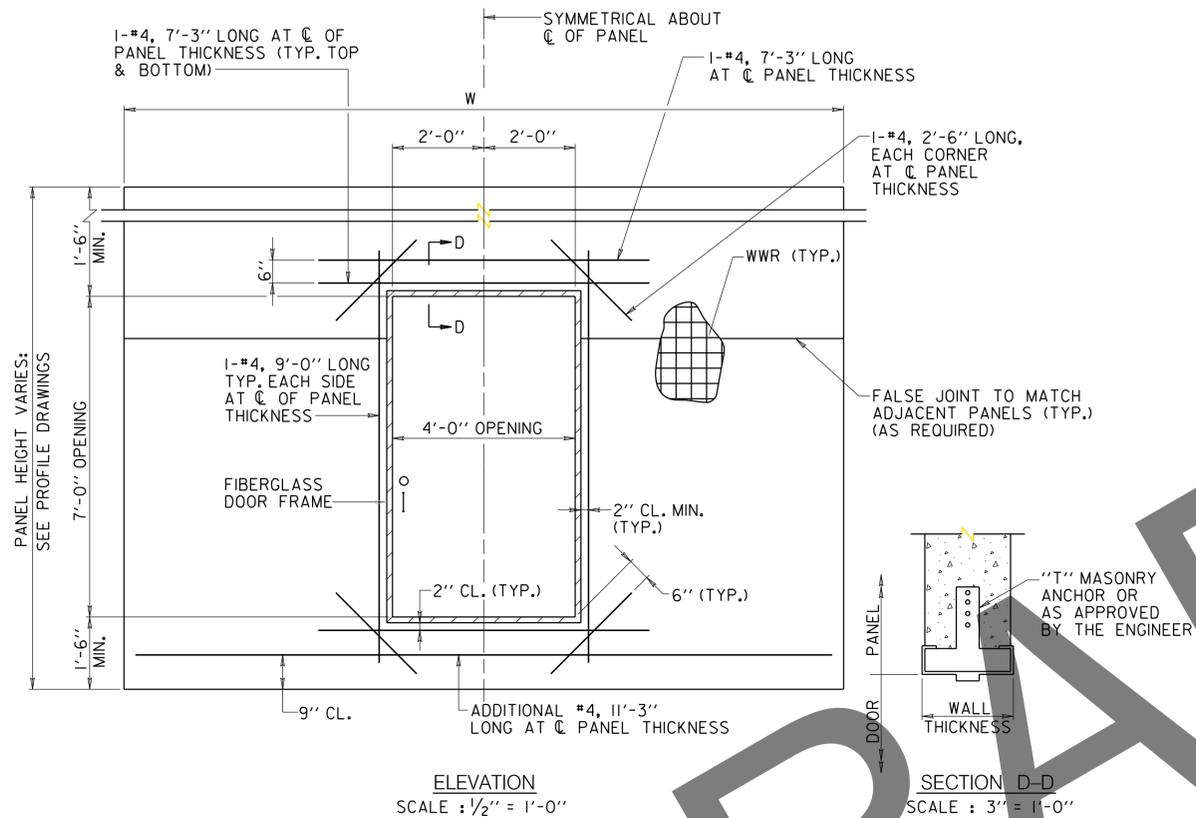
90° CORNER DETAIL

SCALE : 1/2" = 1'-0"

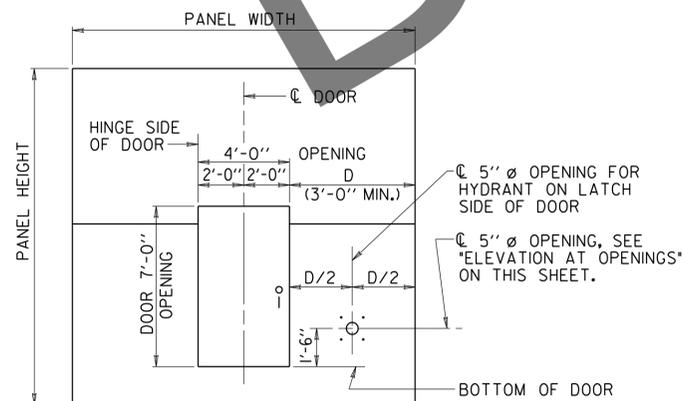
ANCHOR PLATE						
POST SPACING	BARRIER HEIGHT (H)	B	ANCHOR ROD DIAMETER	DIAMETER HOLE	C	D
12'	38' <H<40'	2'-4 1/8"	2/4"	2 3/16"	2 13/16"	1'-8 3/8" FOR TYPICAL POST
						2'-2 1/4" FOR 90° CORNER
	34' <H<38'	2'-3 5/8"	2/4"	2 3/16"	2 13/16"	1'-8 1/8" FOR TYPICAL POST
						2'-2" FOR 90° CORNER
30' <H<34'	2'-2"	2"	2 5/16"	2 1/2"	1'-7 1/2" FOR TYPICAL POST	
					2'-1 1/4" FOR 90° CORNER	
24' <H<30'	2'-1 3/8"	1 3/4"	2 1/16"	2 3/16"	1'-2 3/8" FOR TYPICAL POST	
					1'-11" FOR 90° CORNER	
16'	38' <H<40'	2'-6 1/4"	2/2"	2 13/16"	3/8"	1'-9 3/4" FOR TYPICAL POST
						2'-3 1/2" FOR 90° CORNER
	34' <H<38'	2'-6"	2/2"	2 13/16"	3/8"	1'-11" FOR TYPICAL POST
						2'-3 1/2" FOR 90° CORNER
30' <H<34'	2'-3 7/8"	2/4"	2 3/16"	2 13/16"	1'-9 5/8" FOR TYPICAL POST	
					2'-2" FOR 90° CORNER	
24' <H<30'	2'-2 1/2"	2"	2 5/16"	2 1/2"	1'-3 1/2" FOR TYPICAL POST	
					2'-0 1/4" FOR 90° CORNER	
20'	38' <H<40'	2'-8 1/8"	2 3/4"	3 1/16"	3/16"	1'-9 5/8" FOR TYPICAL POST
						2'-4 13/16" FOR 90° CORNER
	34' <H<38'	2'-7 7/8"	2 3/4"	3 1/16"	3/16"	1'-9 7/8" FOR TYPICAL POST
						2'-4 13/16" FOR 90° CORNER
30' <H<34'	2'-6"	2/2"	2 13/16"	3/8"	1'-9" FOR TYPICAL POST	
					2'-3 3/8" FOR 90° CORNER	
24' <H<30'	2'-3 7/8"	2/4"	2 3/16"	2 13/16"	1'-8 3/8" FOR TYPICAL POST	
					2'-2" FOR 90° CORNER	

90° CORNER PLATE														
POST SPACING	BARRIER HEIGHT (H)	B	B'	D	D'	THICKNESS	DIAMETER HOLE	ANCHOR ROD DIAMETER	A	PLATE	ANGLE	X	Y	Z
12'	38' <H<40'	2'-6 1/2"	1'-3 1/16"	2'-4 5/8"	1'-1"	2 1/2"	2 3/16"	2/4"	4"	1'-7 7/8" X 3/4"	6" X 6" X 3/4"	1/16"	3/8"	5/16"
	34' <H<38'	2'-6"	1'-4"	2'-4 3/8"	1'-1 3/8"	2 1/2"	2 3/16"	2/4"	4"	1'-7 3/4" X 3/4"	6" X 6" X 3/4"	5/8"	5/16"	5/16"
	30' <H<34'	2'-4"	1'-2"	2'-3 1/4"	1'-0 7/8"	2 1/4"	2 5/16"	2"	3 1/2"	1'-7 3/4" X 3/4"	6" X 6" X 3/4"	1/2"	5/16"	5/16"
	24' <H<30'	2'-3 1/2"	1'-1 3/4"	2'-1 1/8"	1'-2"	2"	2 1/16"	1 3/4"	3 1/4"	1'-6 5/8" X 5/8"	5" X 5" X 5/8"	9/16"	5/16"	5/16"
16'	38' <H<40'	2'-9"	1'-4 1/8"	2'-6 1/4"	1'-2 5/16"	2 3/4"	2 13/16"	2 1/2"	4 1/2"	1'-10 1/4" X 1/8"	8" X 8" X 1/8"	1/16"	7/16"	5/16"
	34' <H<38'	2'-8 3/4"	1'-4"	2'-6 1/4"	1'-2 5/16"	2 3/4"	2 13/16"	2 1/2"	4 1/2"	1'-10" X 7/8"	8" X 8" X 7/8"	3/4"	7/16"	5/16"
	30' <H<34'	2'-6 1/4"	1'-4"	2'-4 3/8"	1'-1 3/8"	2 1/2"	2 3/16"	2/4"	4"	1'-7 3/4" X 3/4"	6" X 6" X 3/4"	5/8"	3/8"	5/16"
	24' <H<30'	2'-4 1/2"	1'-2 1/4"	2'-2 1/4"	1'-2 1/2"	2 1/4"	2 5/16"	2"	3 1/2"	1'-6 5/8" X 5/8"	5" X 5" X 5/8"	1/16"	3/8"	5/16"
20'	38' <H<40'	2'-11 1/4"	1'-6 1/4"	2'-7 15/16"	1'-3 1/16"	3"	3 1/16"	2 3/4"	5"	1'-10 3/8" X 1"	8" X 8" X 1"	1"	9/16"	5/16"
	34' <H<38'	2'-11"	1'-6 1/4"	2'-7 15/16"	1'-3 1/16"	3"	3 1/16"	2 3/4"	5"	1'-10 3/8" X 1"	8" X 8" X 1"	7/8"	1/2"	5/16"
	30' <H<34'	2'-8 3/4"	1'-3 5/16"	2'-6 1/8"	1'-2 5/16"	2 3/4"	2 13/16"	2 1/2"	4 1/2"	1'-10" X 7/8"	8" X 8" X 7/8"	3/4"	7/16"	5/16"
	24' <H<30'	2'-6 1/4"	1'-4"	2'-4 3/8"	1'-1 3/8"	2 1/2"	2 3/16"	2/4"	4"	1'-7 3/4" X 3/4"	6" X 6" X 3/4"	5/8"	7/16"	5/16"

DETAIL NO.	OFFICE OF STRUCTURES	
NB-TWM-101	 MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION	
APPROVAL	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'	
DIRECTOR OFFICE OF STRUCTURES	POST CORNER DETAILS	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
1.0	DRAWN BY SHA	
	CHECKED BY SHA	
DRAWING NO. NB-TWM-6 OF 10		SHEET NO. X OF X



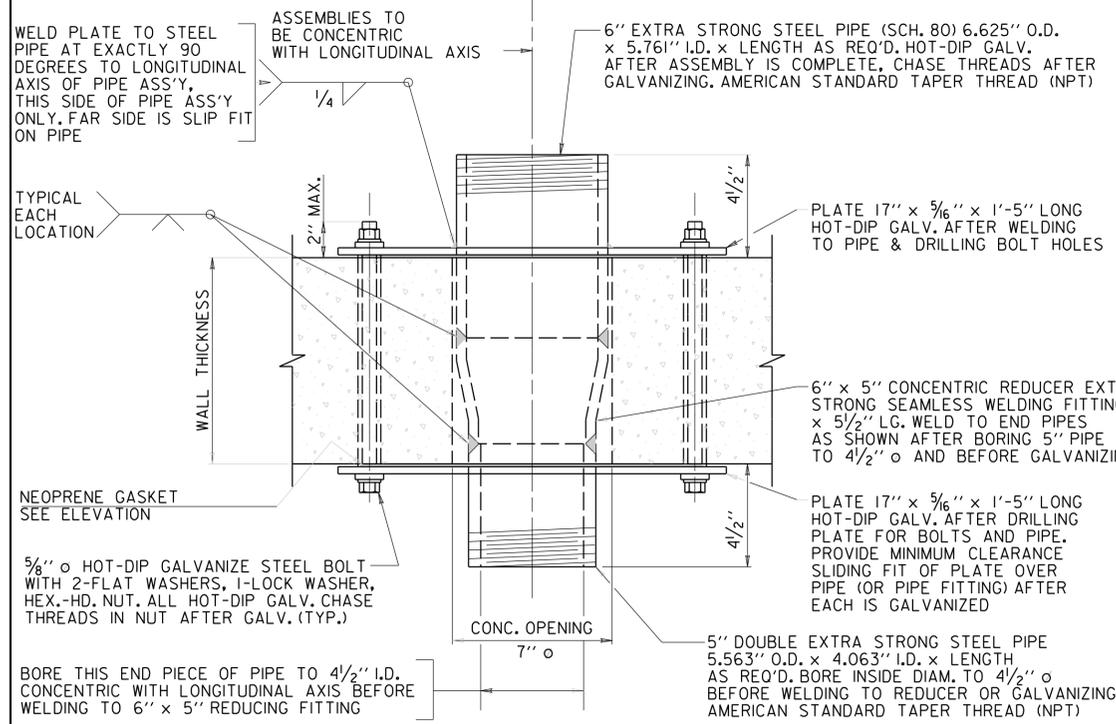
ACCESS DOOR DETAIL



DOOR OPENINGS

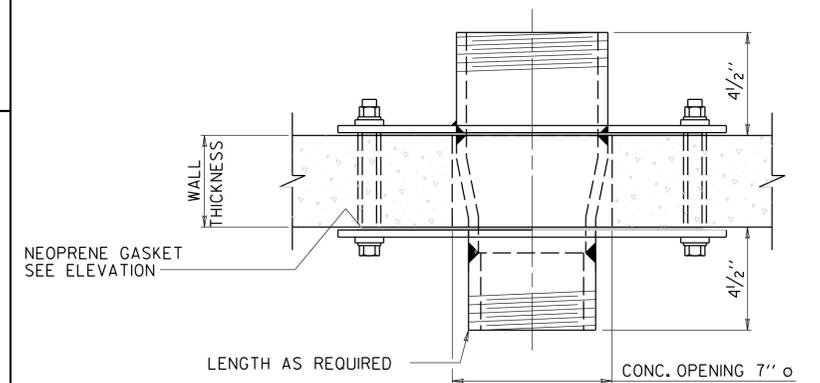
- DOORS, IF REQUIRED, SHALL BE LOCATED AS SHOWN ON THE BARRIER LOCATION PLANS. THE LOWER EDGE OF THE DOOR SHALL BE LOCATED 1'-0" ABOVE THE FINISHED GRADE ON BOTH THE HIGHWAY SIDE AND THE REAR SIDE AT A GIVEN LOCATION.
- DOOR UNIT AND FRAME SHALL BE FIBERGLASS CONSTRUCTION SUITABLE FOR EXTERIOR DOOR APPLICATIONS WITH STAINLESS STEEL HARDWARE. DOORS SHALL BE MOUNTED ON TWO SETS OF HINGES. DOOR COLOR SHALL MATCH THE POST COLOR AND THE FINISH SHALL BE RESISTANT TO FADING FROM EXPOSURE TO ULTRAVIOLET LIGHT. DOORS NEED NOT BE FIRE RATED AND SHALL HAVE A POLYURETHANE FOAM OR MINERAL CORE.
- DOOR PULLS (2 NEEDED, ONE PER SIDE) SHALL BE THRU-BOLTED TO DOORS WITH SPANNER HEAD SCREWS, OR AS APPROVED BY THE ENGINEER. PROVIDE DOOR PULLS IN STAINLESS STEEL FINISH U.S. 32D. CENTER PULLS AT 3'-0" ABOVE FINISHED GRADE.
- DOORS SHALL HAVE TWO-SIDED TUBULAR LOCKING DEVICES WITH ALUMINUM OR STAINLESS STEEL FINISH. ALL LOCKS SHALL BE KEYED TO MATCH THE DOOR LOCKS IN NOISE BARRIERS FOR THE COUNTY IN WHICH THE PROJECT IS LOCATED.
- DOORS SHALL BE MOUNTED FLUSH WITH THE HIGHWAY SIDE OF THE NOISE BARRIER.

DETAIL NO.	NB-TWM-101	OFFICE OF STRUCTURES
APPROVAL	DIRECTOR OFFICE OF STRUCTURES	RETAINING WALL MOUNTED NOISE BARRIER DETAILS STEEL POSTS 24' < H <= 40'
DATE:	DATE <MONTH, YEAR>	CONTRACT NO. <CONTRACT NO.>
VERSION	1.0	DESIGNED BY SHA DRAWN BY SHA CHECKED BY SHA
DRAWING NO. NB-TWM-7 OF 10		SHEET NO. X OF X



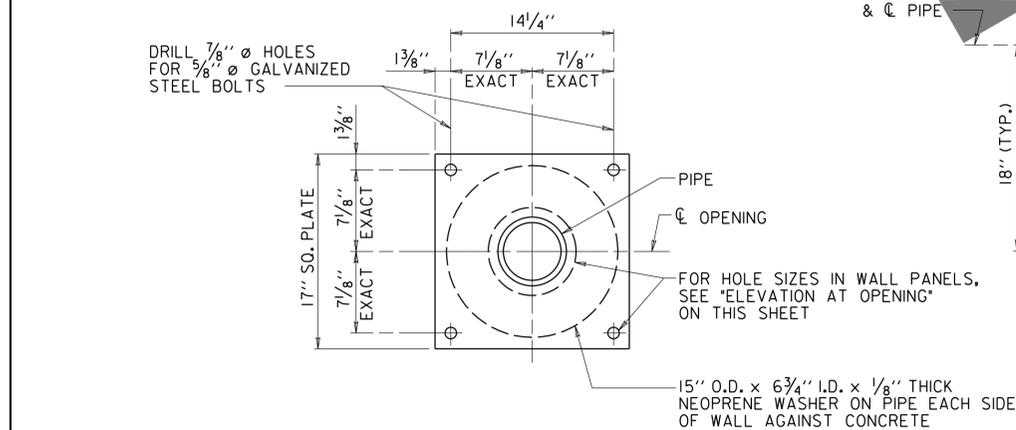
PLAN - PIPE ANCHOR THROUGH WALL

SCALE : 3" = 1'-0"



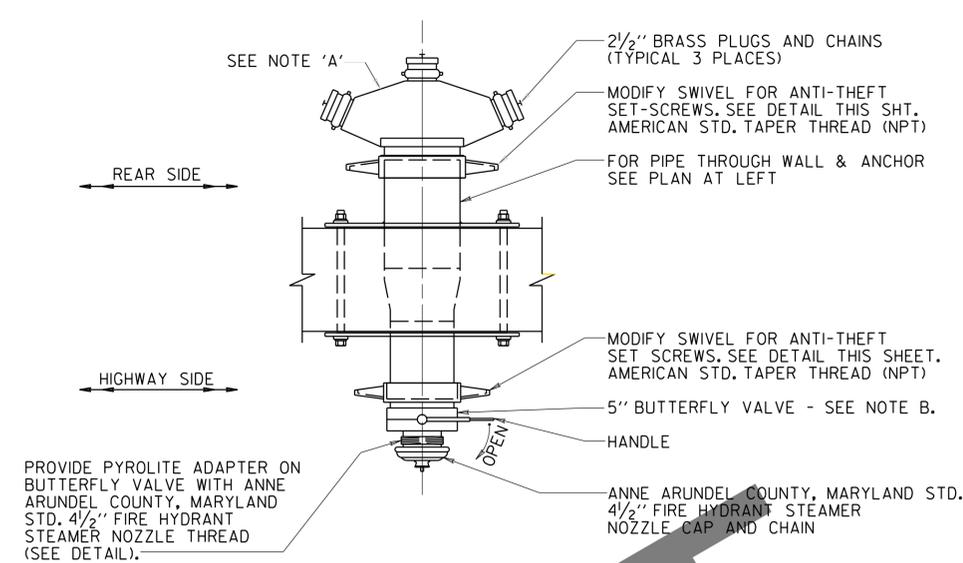
PLAN - PIPE ANCHOR THROUGH WALL

SCALE : 3" = 1'-0"



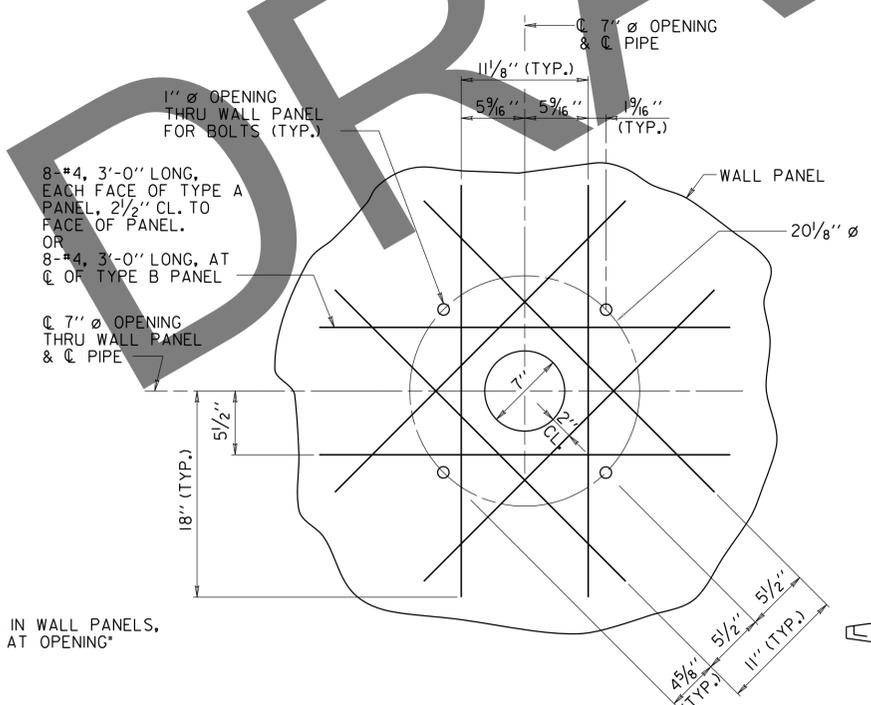
ELEVATION - PIPE ANCHOR ASSEMBLY

SCALE : 1 1/2" = 1'-0"



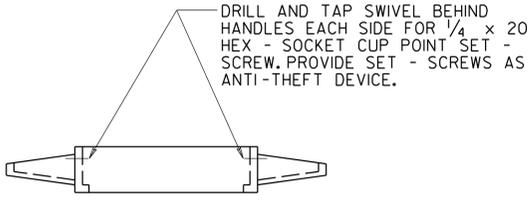
PLAN AT HYDRANT

SCALE : 1 1/2" = 1'-0"



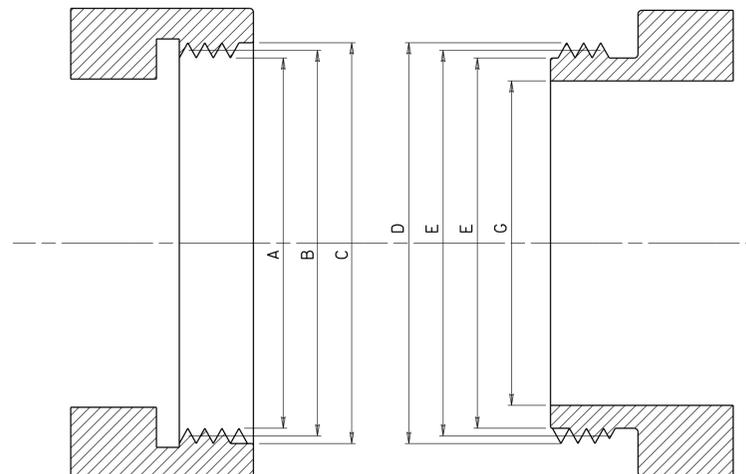
ELEVATION AT OPENINGS

SCALE : 1 1/2" = 1'-0"



SWIVEL ANTI-THEFT DEVICE

SCALE : NONE



THREAD FORM 'V'						
FEMALE			MALE			
A	B	C	D	E	E	G
MINOR DIA.	PITCH DIA.	MAJOR DIA.	MAJOR DIA.	PITCH DIA.	MINOR DIA.	COUPLING I.D.
5.113	5.325	5.546	5.477 x	5.260	5.044	4 1/2"
5.103 x	5.320	5.536	5.467	5.255	5.034	

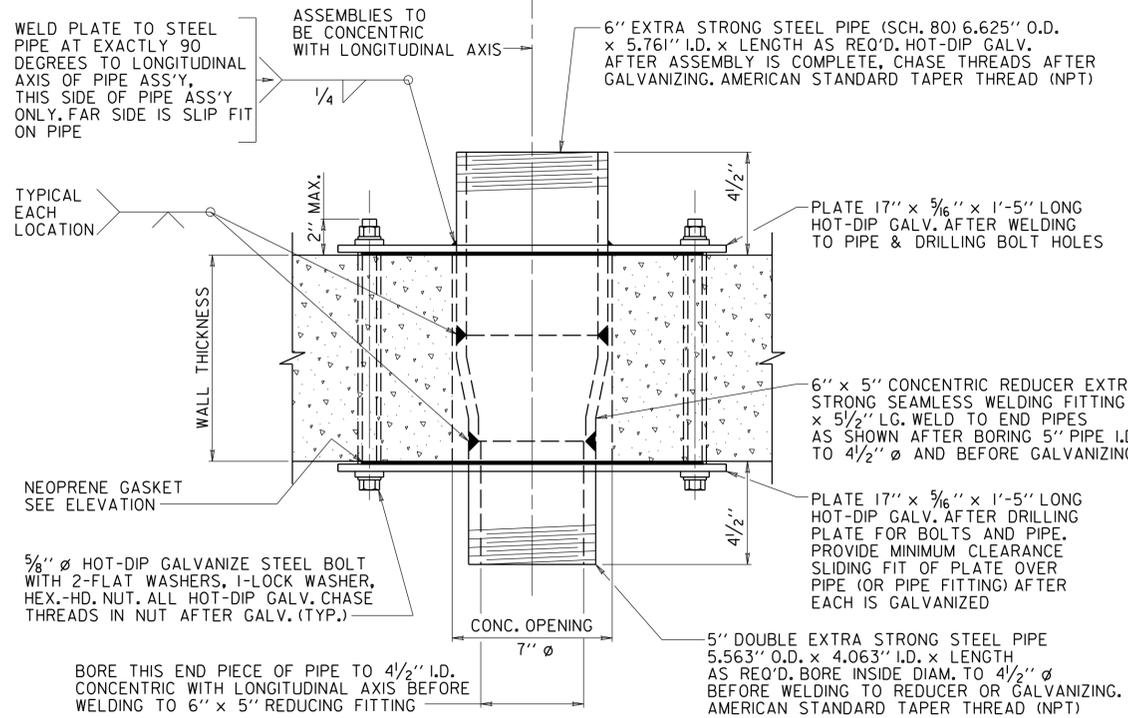
**ANNE ARUNDEL COUNTY
4 1/2" THREAD DETAIL**

SCALE : NONE

GENERAL NOTES

- MATERIALS AND SPECIFICATIONS:**
- | | | |
|---------------|-------|---|
| STEEL PLATE | A 709 | GRADE 36 |
| BOLTS | A 307 | GRADE A |
| PIPE | A 53 | SEAMLESS, GR. B |
| PIPE FITTINGS | A 234 | WROUGHT CARBON STEEL, SEAMLESS |
| GALVANIZING | A 123 | HOT-DIP GALV. FOR STEEL, ETC. |
| | A 153 | HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC. |
- WELDING AMERICAN WELDING SOCIETY AWS D1.1
- WORKING DRAWINGS:**
- WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

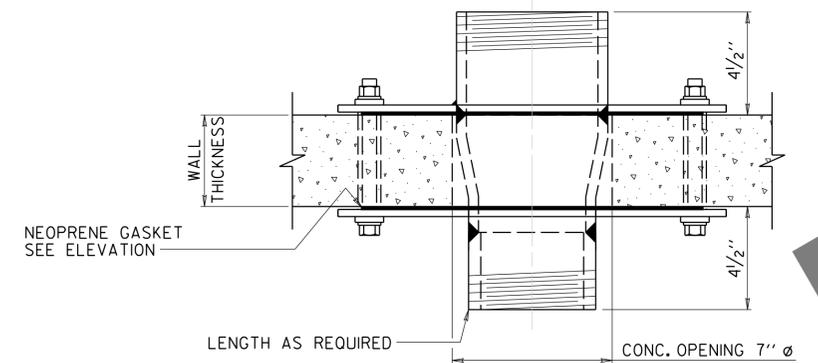
DETAIL NO.	OFFICE OF STRUCTURES	
NB-TWM-101	RETAINING WALL MOUNTED NOISE BARRIER DETAILS	
APPROVAL	STEEL POSTS 24' < H <= 40'	
DIRECTOR OFFICE OF STRUCTURES	HYDRANT CONNECTION (ANNE ARUNDEL COUNTY)	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
	DRAWN BY SHA	
	CHECKED BY SHA	
1.0	DRAWING NO. NB-TWM-9 OF 10	
	SHEET NO. X OF X	



(TYPE A - WALLS 8" OR MORE IN THICKNESS)

PLAN - PIPE ANCHOR THROUGH WALL

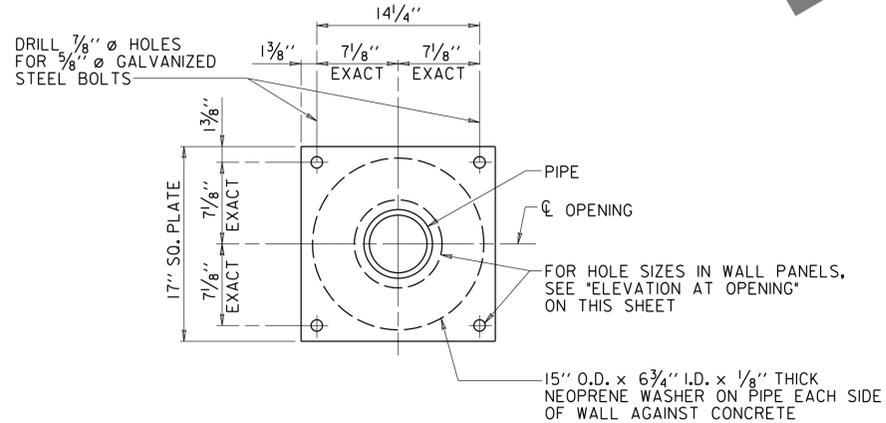
SCALE : 3" = 1'-0"



(TYPE B - WALLS 4' TO LESS THAN 8' IN THICKNESS)

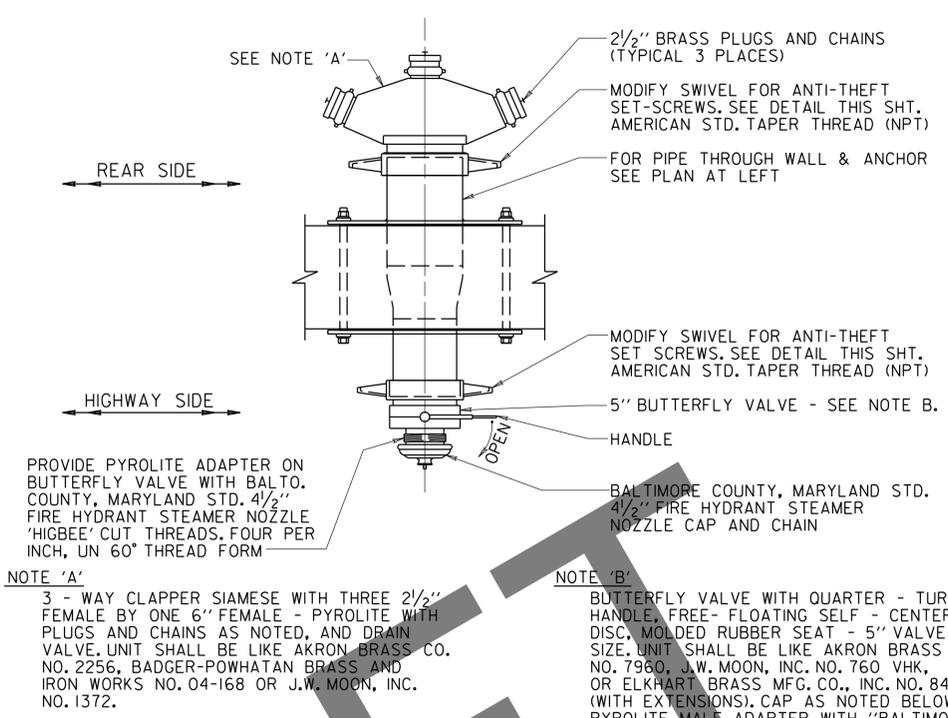
PLAN - PIPE ANCHOR THROUGH WALL

SCALE : 3" = 1'-0"



ELEVATION - PIPE ANCHOR ASSEMBLY

SCALE : 1 1/2" = 1'-0"



PLAN AT HYDRANT

SCALE : 1 1/2" = 1'-0"

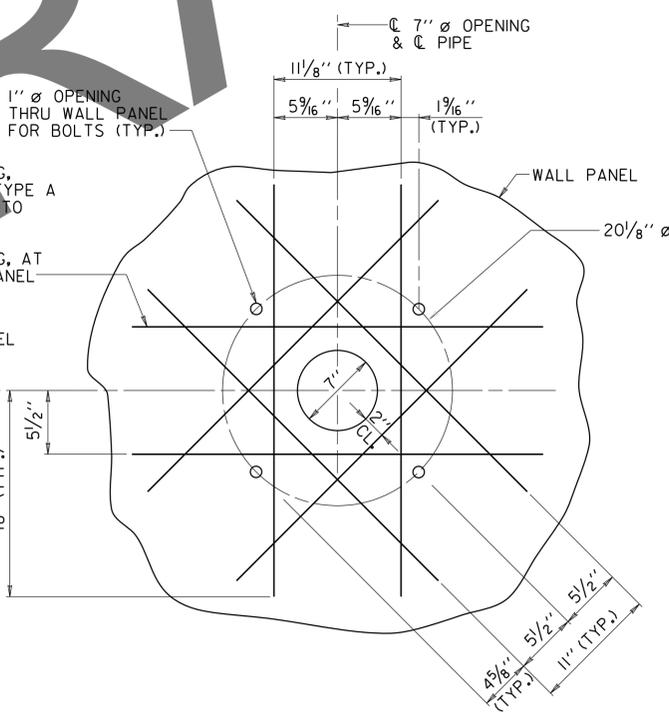


(FOR 3-WAY CLAPPER & BUTTERFLY VALVE)

SWIVEL ANTI - THEFT DEVICE

SCALE : NONE

DRAFT



NOTE: OPENINGS THRU WALL PANELS MUST BE 90 DEGREES WITH THE PLANE OF THE PANELS.

ELEVATION AT OPENINGS

SCALE : 1 1/2" = 1'-0"

GENERAL NOTES

MATERIALS AND SPECIFICATIONS:

STEEL PLATE	A 709	GRADE 36
BOLTS	A 307	GRADE A
PIPE	A 53	SEAMLESS, GR. B
PIPE FITTINGS	A 234	WROUGHT CARBON STEEL, SEAMLESS
GALVANIZING	A 123	HOT-DIP GALV. FOR STEEL PLATE, ETC.
	A 153	HOT-DIP GALV. CLASS C FOR HARDWARE, BOLTS, ETC.
WELDING	AMERICAN WELDING SOCIETY AWS D1.1	

WORKING DRAWINGS:

WORKING DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL. MATERIAL SHALL NOT BE FABRICATED OR DELIVERED TO THE SITE UNTIL WORKING DRAWINGS HAVE BEEN APPROVED. WORKING DRAWINGS OF PIPE ANCHOR ASSEMBLY SHALL SHOW COMPLETE DETAILS AND DIMENSIONS. FOR STANDARD STOCK ITEMS, THE CONTRACTOR SHALL FURNISH OUTLINE OR CATALOG INFORMATION AND SHALL DETAIL ANY CHANGES OR MODIFICATIONS MADE TO THE PRODUCT FOR INCORPORATION IN THIS WORK.

DETAIL NO.	OFFICE OF STRUCTURES	
NB-TWM-101	RETAINING WALL MOUNTED NOISE BARRIER DETAILS	
APPROVAL	STEEL POSTS 24' < H <= 40'	
DIRECTOR OFFICE OF STRUCTURES	HYDRANT CONNECTION (BALTIMORE COUNTY)	
DATE:	SCALE VARIES	DATE <MONTH, YEAR> CONTRACT NO. <CONTRACT NO.>
VERSION	DESIGNED BY SHA	
	DRAWN BY SHA	
	CHECKED BY SHA	
1.0	DRAWING NO. NB-TWM-10 OF 10	SHEET NO. X OF X